

BIO-INSPIRED TEXTILES:
a poetic approach to raise awareness
about air quality at home

Elena Brebenel

A thesis submitted in partial fulfillment of the requirements
for the Degree of Doctor of Philosophy (Ph.D.)
University of the Arts London
Central Saint Martins
January 2022

ABSTRACT

At home, we are exposed to the hidden effects of microbial and chemical factors that affect air quality and have a negative impact on our health. This practice-led textile research addresses the challenge of raising awareness about air quality in the home environment. It aims to establish a poetic approach to raising awareness that also empowers people to improve their homes and contributes to their wellbeing.

The research is comprised of two stages. The first stage involves the generation and evaluation of interactive textile artefacts that raise awareness about air quality at home and that function as domestic probes. This stage utilises bio-inspiration as a way to abstract design principles from the biological model, represented here by the nest behaviour of the female blue tit bird (*Cyanistes caeruleus*) and apply them to the design of textile samples and artefacts. It evaluates the artefacts through two iterative adoption experiments in which they were placed in participants' homes. Analysis of the data collected in the form of interviews and personal journal studies showed the potential the artefacts have in raising awareness about air quality, in empowering participants to improve their homes and in generating a sense of wellbeing at home. This was due to the repetitive engagement with the artefacts, an awareness about the bio-inspired narrative, and their aesthetic. Informed by these findings, guidelines for bio-inspired design that raises awareness about air quality were established and evaluated during the second research stage. The testing involved their practical application by undergraduate students via a design brief as part of a course on bio-inspiration. Analysis of the data collected in the form of students' projects and feedback forms confirmed their applicability in design and revealed the challenges that occurred in this practical application.

The research contributes to the field of bio-inspiration and the discipline of textile design by providing guidelines for design that raises awareness about air quality, supplemented by full visual documentation of *Bio-inspired Awareness*, a physical example of a bio-inspired artefact that raises awareness about air quality.

ACKNOWLEDGEMENTS

I dedicate this work to my family, my sister Alina, my mother Adina, and my father Marian.

I would like to thank my supervisory team, Prof. Carole Collet and Prof. Janet McDonnell; my Ph.D. colleagues and friends Joana, Lara, Elena, Adriana, and Fahad; and Dr. Ann-Barbara Graff from NSCAD (Nova Scotia College of Art and Design) University. Last, but not least, special thanks go to the anonymous participants in the two adoption experiments, and the *Bio-inspired Artefacts* course.

COPYRIGHT

This document represents the submission for the degree of Doctor of Philosophy at the University of the Arts London. No text from this thesis may be published without appropriate acknowledgment and notification of the author.

PUBLICATIONS

Exhibitions

(2014) *PhD by Design Conference Exhibition*. Goldsmiths College, London, England UK
(November 6 – 7, 2014)

(2015) *SPOTLIGHT 2015 – Doctoral Exhibition*. Central Saint Martins, London, England UK
(February 23 – March 11, 2015)

Surprise and Serendipity. Apiary Studio, London, England UK
(April 23 – 30, 2015)

(2019) *Bio-inspired Craft*. Artifex Gallery, Vilnius, Lithuania
(April 24 – May 11, 2019) *solo exhibition

(2020) *Point, Line, Plane, Pattern*. Heights Arts Gallery, Cleveland OH, USA
(January 17 - March 1, 2020)

Presentations

(2014) *How can design lead to a more sustainable future?*
Ring Road Event, Creative Incubaator Business Centre, Tallinn, Estonia

Can biomimicry help design furnishings for the domestic environment that improve air quality?
PhD by Design Conference, Goldsmith College, London, England UK

(2018) *How can bio-inspired textile artefacts raise awareness about the health of the home environment with a focus on air quality?*
Research Day Symposium, NSCAD University, Halifax NS, Canada

(2019) *The craft of bio-inspired textiles*.
Visiting Artist Lecture as part of the *Bio-inspired Craft* exhibition,
Vilnius Academy of Fine Arts, Vilnius, Lithuania

Bio-inspired textiles that raise awareness about domestic air pollution.
D_TEX 'Textile, Identity and Innovation' 2nd International Textile Design Conference,
Faculty of Architecture, University of Lisbon, Portugal

From bio-inspiration to awareness and wellbeing at home.
Design Science Symposium 'Inclusive Narratives from Nature', RISD + The Nature Lab,
Rhode Island School of Design, Providence RI, USA

(2020) *Guidelines for bio-inspired design that raises awareness about air quality.*
Environmental Science and Design Research Symposium 'Biodesign: Designing with
Life for Environmental Sustainability', Kent State University, Kent OH, USA

Peer-reviewed paper in conference proceedings

(2020) Bio-inspired textiles that raise awareness about domestic air pollution by Elena Brebenel. In:
Montagna, G. & Paulo Carvalho Figueiredo, M. C. (eds.) *Textiles, Identity and Innovation: In
Touch: Proceedings of the 2nd International Textile Design Conference (D_TEX 2019)*, 19-21
June, Lisbon, Portugal. 1st edition. CRC Press

For more information please see Appendix X – Publications on pages 416 – 425.

CONTENTS

Abstract	3
Acknowledgements	5
Copyright	7
Publications	9
Contents	11
List of Figures	19
1. Introduction	23
1.1. Project overview and background	24
1.2. Research aim and objectives	27
1.3. Methodology	28
1.4. Map of research	29
1.5. Original contributions to knowledge	31
1.5.1. Major contribution	31
1.5.2. Minor contributions	31
1.6. Thesis summary	31
2. Contextual review: air pollution at home and raising awareness	33
2.1. Literature review: air pollution at home	34
2.1.1. Short history of domestic air pollution in Europe	34
2.1.2. Analysis of the official reports on domestic air pollution	34
2.1.2.1. Mapping of the findings of official reports on domestic air pollution	35
2.2. Literature review: raising awareness as quiet activism	36
2.2.1. Quiet activism	37
2.2.1.1. Poetic textile practice	38
2.3. Review of contemporary practice: design for air quality	39
2.3.1. Mapping of design practice for air quality	39
2.3.2. Analysis of design practice that raises awareness about air quality	42
2.3.2.1. Visual summary of the projects that raise awareness about air quality	46
2.3.3. Key findings from the review of contemporary practice	47
2.4. Summary of <i>Contextual review: air pollution at home and raising awareness</i>	47
3. Contextual review: bio-inspiration	49
3.1. Literature review: bio-inspiration	50
3.1.1. Short history of design inspired by nature	50
3.1.1.1. Biomimicry	51
3.1.1.2. Bio-inspiration	52
3.1.1.3. Biophilic design	52
3.1.2. Bio-inspiration and biomimicry in this research	54
3.1.3. Bio-inspiration and biophilic design in this research	56
3.1.4. The landscape of 'bio' related design field	56
3.2. Review of contemporary practice: bio-inspired design	57

3.2.1. Analysis of bio-inspired design practice with a focus on textiles	58
3.2.2. Mapping of bio-inspired design with a focus on design for air quality	60
3.2.3. Approaches to working with bio-inspiration in design	61
3.2.4. Key findings from the review of contemporary practice	63
3.3. The bio-inspired design process and the biological model	64
3.3.1. Literature review: bio-inspiration process	64
3.3.2. Bio-inspiration process in this research	65
3.3.3. Biologising the challenge	66
3.3.3.1. Biological model: nest behaviour of female blue tit bird	68
3.4. Summary of <i>Contextual review: bio-inspiration</i>	69
4. Methodology	71
4.1. Research stages with multiple methods	72
4.2. Research through design	73
4.2.1. The role of prototypes in research through design	73
4.2.2. Cultural probes	74
4.2.2.1. The role of textile artefacts as cultural/design probes	76
4.3. Theoretical frameworks	77
4.4. Methods used in the development of practice	78
4.4.1. Bio-inspired textile design process	79
4.4.2. Prototyping	80
4.4.3. Creative and systematic sampling	80
4.4.4. Thinking through making	81
4.5. Methods used in the evaluation of practice	82
4.5.1. Adoption experiments	82
4.5.1.1. Semi-structured interviews	82
4.5.1.1.1. Operationalisation	85
4.5.1.2. Diary studies	85
4.5.1.3. Photography studies	87
4.5.2. Workshop	87
4.5.3. Data analysis	88
4.5.3.1. Comparison	88
4.5.4. Ethical considerations	88
4.5.5. Reflection	89
4.5.6. Visual mapping	89
4.6. Summary of <i>Methodology</i>	90
5. Design practice: <i>Home Pharmacy</i> and textile research	91
5.1. <i>Home Pharmacy</i>	92
5.1.1. Description of <i>Home Pharmacy</i>	92
5.1.2. Reflection on <i>Home Pharmacy</i>	93
5.1.3. Ritual theory	96
5.1.4. Conclusions	97
5.2. Design brief	97
5.3. Overview of textile practice	99

5.4. Designing the textile samples	100
5.4.1. Functional inspiration taken from the nest behaviour of blue tit female bird	100
5.4.2. Ritualising the interactions	102
5.4.3. Symbolic inspiration taken from the nest behaviour of blue tit female bird	103
5.5. Making the textile samples	104
5.5.1. Drawing	104
5.5.2. Textile materials	105
5.5.3. Textile processes	107
5.5.4. Reflection on making	107
5.6. Overview and analysis of textile samples	109
5.6.1. The small-scale samples	109
5.6.2. The medium-scale samples	111
5.7. Summary of <i>Design practice: Home Pharmacy and textile research</i>	114
6. Evaluation of textile practice	117
6.1. The first adoption experiment	118
6.1.1. Textile artefacts for the first adoption experiment: <i>Home Pharmacy, Remedial Landscape and Nest Engagement</i>	118
6.1.2. Results of operationalisation of 'air pollution at home'	123
6.1.3. Recruitment and procedure	124
6.1.4. Collected data	125
6.1.5. Qualitative results	126
6.2. The second adoption experiment	131
6.2.1. Textile artefacts for the second adoption experiment	131
6.2.2. Recruitment and procedure	138
6.2.3. Collected data	140
6.2.4. Qualitative results	141
6.2.5. Follow-up interviews with participants from the second adoption experiment	146
6.2.5.1. Recruitment and procedure	148
6.2.5.2. Collected data	148
6.2.5.3. Qualitative results	148
6.3. Comparative analysis between the contemporary designs that raise awareness about air quality and this project	152
6.4. Summary of <i>Evaluation of textile practice</i>	153
7. Establish, test, revise and integrate the bio-inspired design guidelines	157
7.1. Establish the guidelines for bio-inspired design that raises awareness about air quality	158
7.2. Test the guidelines for bio-inspired design that raises awareness about air quality	159
7.2.1. The <i>Bio-inspired Artefacts</i> course	159
7.2.2. Recruitment and procedure	161
7.2.3. Collected data	162
7.2.4. Design results	162
7.2.4.1. The materialisation of guidelines in the students' projects	162
7.2.4.2. Comparative analysis between my practice and students' projects	170

7.2.4.3. Observations in regard to applying the guidelines in an educational setting	173
7.2.5. Conclusions	173
7.3. Revise the guidelines for bio-inspired design that raises awareness about air quality	175
7.4. <i>Bio-inspired Awareness</i>	176
7.5. Summary of <i>Establish, test, revise and integrate the bio-inspired design guidelines</i>	182
8. Conclusions	185
8.1. Summary of research	186
8.2. Contributions of the research	190
8.2.1. Major contribution	190
8.2.2. Minor contributions	192
8.3. Potential future research	193
List of references	195
List of references for practice case studies	207
Glossary	213
Appendices	215
Appendix A – Small-Scale Samples in set no. 1	215
A 1 Sample 1.1	215
A 2 Sample 1.2	216
A 3 Sample 1.3	217
A 4 Sample 1.4	218
A 5 Sample 1.5	219
A 6 Sample 1.6	220
A 7 Sample 1.7	221
A 8 Sample 1.8	222
A 9 Sample 1.9	223
A 10 Sample 1.10	224
A 11 Sample 1.11	225
Appendix B – Medium-Scale Samples in set no.1	226
B 1 Medium-scale sample 1	226
B 2 Medium-scale sample 2	227
Appendix C – Large-Scale Artefact in set no. 1 for the first adoption experiment:	
<i>Home Pharmacy</i>	228
Appendix D – Large-Scale Artefacts in set no. 1 for the second adoption experiment	229
D 1 Artefact 2.	229
D 2 Artefact 2.2	230
Appendix E – Small-Scale Samples in set no. 2	231
E 1 Sample 2.1	231
E 2 Sample 2.2	232
E 3 Sample 2.3	233
E 4 Sample 2.4	234

E 5 Sample 2.5	235
E 6 Sample 2.6	236
E 7 Sample 2.7	237
E 8 Sample 2.8	238
E 9 Sample 2.9	239
E 10 Sample 2.10	240
Appendix F – Medium-Scale Samples in set no. 2	241
F 1 Medium-scale sample 1	241
F 2 Medium-scale sample 2	242
Appendix G – Large-Scale Artefact in set no. 2 for the first adoption experiment: <i>Remedial Landscape</i>	243
Appendix H – Large-Scale Artefacts in set no. 2 for the second adoption experiment	244
H 1 Artefact 2.3	244
H 2 Artefact 2.4	245
 Appendix I – Small-Scale Samples in set no. 3	246
I 1 Sample 3.1	246
I 2 Sample 3.2	247
I 3 Sample 3.3	248
I 4 Sample 3.4	249
I 5 Sample 3.5	250
Appendix J – Medium-Scale Samples in set no. 3	251
J 1 Medium-scale sample 1	251
J 2 Medium-scale sample 2	252
Appendix K – Large-Scale Artefact in set no. 3 for the first adoption experiment: <i>Nest Engagement</i>	253
Appendix L – Large-Scale Artefacts in set no. 3 for the second adoption experiment	254
L 1 Artefact 2.5	254
L 2 Artefact 2.6 (<i>Nest Engagement</i>) (re-made)	255
 Appendix M – Operationalising the Concept of Awareness about Air Pollution at Home	256
 Appendix N – Participant Information Sheets	258
N 1 Participant Information Sheet for the first adoption experiment	258
N 2 Participant Information Sheet for the second adoption experiment	260
N 3 Participant Information Sheet for follow-up interviews	262
 Appendix O – Consent Forms	264
O 1 Consent Form for the first adoption experiment	264
O 2 Consent Form for the second adoption experiment	265
O 3 Consent Form for follow-up interviews	266
Appendix P – Adoption Form	267
 Appendix Q – Recruitment Emails	269
Q 1 Recruitment email for the second adoption experiment	269

Q 2 Recruitment email for follow-up interviews	270
Appendix R – Interview Transcripts	271
R 1 Interviews transcripts from the first adoption experiment	271
R 1.1 Interview with P 1.1 adopting <i>Home Pharmacy</i>	271
R 1.2 Interview with P 1.2 adopting <i>Remedial Landscape</i>	276
R 1.3 Interview with P 1.3 adopting <i>Nest Engagement</i>	282
R 2 Interviews transcripts from the second adoption experiment	287
R 2.1 Interview with P 2.1 adopting Artefact 2.1	287
R 2.2 Interview with P 2.2 adopting Artefact 2.2	293
R 2.3 Interview with P 2.3 adopting Artefact 2.3	298
R 2.4 Interview with P 2.4 adopting Artefact 2.4	302
R 2.5 Interview with P 2.5 adopting Artefact 2.5	307
R 2.6 Interview with P 2.6 adopting Artefact 2.6 (<i>Nest Engagement</i>)	312
R 3 Interview transcripts from the follow-up interviews	317
R 3.1 Follow-up interview with P 2.2	317
R 3.2 Follow-up interview with P 2.3	322
R 3.3 Follow-up interview with P 2.4	325
R 3.4 Follow-up interview with P 2.5	330
R 3.5 Follow-up interview with P 2.6	336
Appendix S – Journals Scans	340
S 1 Journals scans from the first adoption experiment	340
S 1.1 Journal for <i>Home Pharmacy</i>	340
S 1.2 Journal for <i>Remedial Landscape</i>	341
S 1.3 Journal for <i>Nest Engagement</i>	342
S 2 Journals scans from the second adoption experiment	343
S 2.1 Journal for Artefact 2.1	343
S 2.2 Journal for Artefact 2.2	344
S 2.3 Journal for Artefact 2.3	345
S 2.4 Journal for Artefact 2.4	346
S 2.5 Journal for Artefact 2.5	349
S 2.6 Journal for Artefact 2.6 (<i>Nest Engagement</i>)	350
Appendix T – Digital Photographs	351
T 1 Digital photographs from the first adoption experiment	351
T 2 Digital photographs from the second adoption experiment	352
Appendix U – Analysis of Data from Adoption Experiments	353
U 1 Data analysis for the first adoption experiment	353
U 1.1 Sample of data reduction from interviews in the first adoption experiment	353
U 1.2 First adoption experiment journals data reduction	354
U 1.3 First adoption experiment interviews + journals data display	355
U 2 Data analysis for the second adoption experiment	360

U 2.1 Sample of data reduction from interviews in the second adoption experiment	360
U 2.2 Second adoption experiment journals data reduction	361
U 2.3 Second adoption experiment interviews + journals data display	362
U 3 Data analysis for the follow-up Interviews	368
U 3.1 Sample of data reduction from the follow-up interviews	368
U 3.2 Follow-up interviews data display	369
 Appendix V – <i>Bio-inspired Artefacts</i> Course	376
V 1 Course outline	376
V 2 Project brief	381
V 3 Recruitment email	385
V 4 Participant information sheet	386
V 5 Consent Form	387
V 6 Student projects	388
V 6.1 Project of student no. 1	388
V 6.2 Project of student no. 2	393
V 6.3 Project of student no. 3	398
V 6.4 Project of student no. 4	404
V 7 Scans of the feedback forms	409
V 7.1 Feedback form of student no. 1	409
V 7.2 Feedback form of student no. 3	411
V 7.3 Feedback form of student no. 4	413
 Appendix W – Ethics Approval Letters	414
W 1 UAL ethics approval letter	414
W 2 Saint Mary's University (for NSCAD University) ethics approval letter	415
 Appendix X – Publications	416
X 1 Published paper <i>Bioinspired textiles that raise awareness about domestic air quality</i>	416
X 2 Exhibition <i>Bio-inspired Craft</i>	423
X 2.1 Exhibition Poster	423
X 2.2 Exhibition Documentation	424

LIST OF FIGURES

All figures and photographs credit Elena Brebenel, unless otherwise specified.

Chapter 1

Figure 1:1 Situating research	24
Figure 1:2 Situating research with details about the research strategy	27
Figure 1:3 <i>Home Pharmacy, Remedial Landscape and Nest Engagement</i>	29
Figure 1:4 Map of research	30

Chapter 2

Figure 2:1 Map of findings of the reports on indoor air quality and of possible solutions to address the issue	36
Figure 2:2 Mapping of contemporary design practice on air quality	42
Figure 2:3 Analysis of contemporary practice that raises awareness about air quality	47

Chapter 3

Figure 3:1 The conceptual relation between bio-inspiration, biomimicry and bionics/ biomimetics (after Benyus, 2002)	55
Figure 3:2 Map of concepts in the landscape of 'bio' related design field	57
Figure 3:3 A collection of bio-inspired textiles	59
Figure 3:4 Review of bio-inspired practice for air quality	61
Figure 3:5 The two approaches to the biomimicry process (Biomimicry 3.8, 2015)	64
Figure 3:6 The bio-inspiration process in this research	66
Figure 3:7 Review of scientific literature for biological models	67
Figure 3:8 Findings of the review of scientific literature for biological models	68

Chapter 4

Figure 4:1 Overview of the research through design phases	73
Figure 4:2 Overview of methods and techniques, tools and theoretical frames	78
Figure 4:3 The phases of the textile design process as articulated by Wilson (2000) and Studd (2002) and the phases of the bio-inspiration process as articulated in section 3.3.2	79
Figure 4:4 The bio-inspired textile design process in this research	80
Figure 4:5 The tentative hypothesis in this research	82
Figure 4:6 Interview guide with questions in the order they were analysed	83
Figure 4:7 Aspects investigated in the journals	85
Figure 4:8 Instructions about recording information in the journal	85

Chapter 5

Figure 5:1 <i>Home Pharmacy</i> . Photographs by Cristina Schek (Brebenel, 2020)	93
Figure 5:2 <i>Home Pharmacy</i> as it was displayed at Apiary Studio	94
Figure 5:3 Reflection on <i>Home Pharmacy</i> in relation to the nest behaviour of the blue tit	95
Figure 5:4 Design brief	98
Figure 5:5 Overview of textile practice	100
Figure 5:6 Translation of design principle into design work (Brebenel, 2020)	101
Figure 5:7 The samples that represent the translation of design principle into design work	103

Figure 5:8 The story of the nest behaviour of female blue tit bird as included in the adoption package	103
Figure 5:9 Pages with drawings from the resource notebook	105
Figure 5:10 Pages with material swatches from the resource notebook (Brebeneil, 2020)	106
Figure 5:11 The making environment	108
Figure 5:12 Making of the loose fragments for <i>Nest Engagement</i>	109
Figure 5:13 Overview of interactions in the three sets of small-scale samples	110
Figure 5:14 Medium-scale samples for set no. 1	112
Figure 5:15 Medium-scale samples for set no. 2	113
Figure 5:16 Medium-scale samples for set no. 3	114

Chapter 6

Figure 6:1 The three artefacts (<i>Home Pharmacy, Remedial Landscape, and Nest Engagement</i>) evaluated during the first adoption experiment	118
Figure 6:2 <i>Remedial Landscape</i>	120
Figure 6:3 <i>Nest Engagement</i>	121
Figure 6:4 The three adoption packages	122
Figure 6:5 Contents of the adoption package (<i>Nest Engagement</i>) (Brebeneil, 2020)	123
Figure 6:6 Results of the operationalisation of the concept of air pollution at home	124
Figure 6:7 What artefact was adopted by what participant in the first adoption experiment	124
Figure 6:8 Directions for interacting with artefacts in the first adoption experiment	125
Figure 6:9 Journal data from the first adoption experiment which took place August 13 – August 29, 2017	126
Figure 6:10 A selection of data from the first adoption experiment regarding the role of functional inspiration and symbolic inspiration in raising awareness	128
Figure 6:11 A selection of excerpts describing the role of the aesthetic of the artefacts and interactions in the first adoption experiment	129
Figure 6:12 The six artefacts (<i>Artefact 2.1, Artefact 2.2, Artefact 2.3, Artefact 2.4, Artefact 2.5, Artefact 2.6</i>) evaluated during the second adoption experiment	132
Figure 6:13 Artefact 2.1	133
Figure 6:14 Artefact 2.2	134
Figure 6:15 Artefact 2.3	135
Figure 6:16 Artefact 2.4	136
Figure 6:17 Artefact 2.5	137
Figure 6:18 Contents of the adoption package in which <i>Artefact 2.3</i> was placed	138
Figure 6:19 What artefact was adopted by what participant in the second adoption experiment	139
Figure 6:20 Directions for interacting with artefacts in the second adoption experiment	140
Figure 6:21 Journal data from the second adoption experiment which took place January 19 – February 7, 2017	141
Figure 6:22 A selection of data from the second adoption experiment regarding the role of functional inspiration and symbolic inspiration in raising awareness	143
Figure 6:23 A selection of excerpts describing the role of the aesthetic of the artefacts and interactions in the second adoption experiment	145
Figure 6:24 The second adoption experiment follow-up interview guide	147
Figure 6:25 A selection of data from the follow-up interviews reflecting the role of	

bio-inspiration in raising awareness	149
Figure 6:26 Excerpts from the follow-up interviews reflecting the role of storytelling in initiating behaviour	150
Figure 6:27 Excerpts from the follow-up interviews reflecting the calming experience	151
Figure 6:28 Summary of the contemporary practice that raises awareness about air quality in comparison to the textile artefacts I developed (in relation to the four criteria)	153
 Chapter 7	
Figure 7:1 Feedback form comments and questions	162
Figure 7:2 The inspiration behind the four projects	163
Figure 7:3 Project no. 1 – <i>Shut Eye Stomata Inspired Curtain</i> and <i>Stomata Plant Hanger</i> by Student 1 (photo credit S 1)	164
Figure 7:4 Project no. 2 – <i>Peppered Moth Particular Matter Catcher</i> by Student 2 (photo credit S 2)	165
Figure 7:5 Project no. 3 – <i>Filther Feeder</i> by Student 3 (photo credit S 3)	166
Figure 7:6 Project no. 4 – <i>Dust Filter for Windows</i> by Student 4 (photo credit S 4)	167
Figure 7:7 The narrative for Project no. 3 <i>The Filther Feeder</i> by Student 3	168
Figure 7:8 Summary of the practical application of guidelines in the four projects	170
Figure 7:9 Summary of the analysis of the students' projects in comparison to my project	172
Figure 7:10 The wall-hanging part of <i>Bio-inspired Awareness</i>	178
Figure 7:11 The paper fragments infused with essential oil of lavender	179
Figure 7:12 The paper fragments infused with essential oil of peppermint	179
Figure 7:13 Instruction manual for <i>Bio-inspired Awareness</i>	180
Figure 7:14 Example of interaction in <i>Bio-inspired Awareness</i>	180
 Chapter 8	
Figure 8:1 Contribution to knowledge in the form of design guidelines accompanied by visual documentation of <i>Bio-inspired Awareness</i> artefact	191

1. Introduction

1.1. Project overview and background

This research practice is situated at the intersection of bio-inspiration (Whitesides, 2015) and textile design (Figure 1:1). The work is applied to raising awareness about air quality in the home environment. At home, we are constantly exposed to the hidden effects of biotic (microbial) and abiotic (chemical) factors that affect air quality and have a negative impact on our health. The World Health Organisation (WHO) report on indoor air quality states that ‘indoor air pollution – such as from dampness, mould, chemicals and other biological agents – is a major cause of morbidity and mortality worldwide’ (2009, p. XI), and that prolonged exposure to domestic air pollution can cause asthma, liver and central nervous system damage, and even cancer. In this context, the research is asking the following question: How can bio-inspired textile artefacts raise awareness about air quality in the home environment?

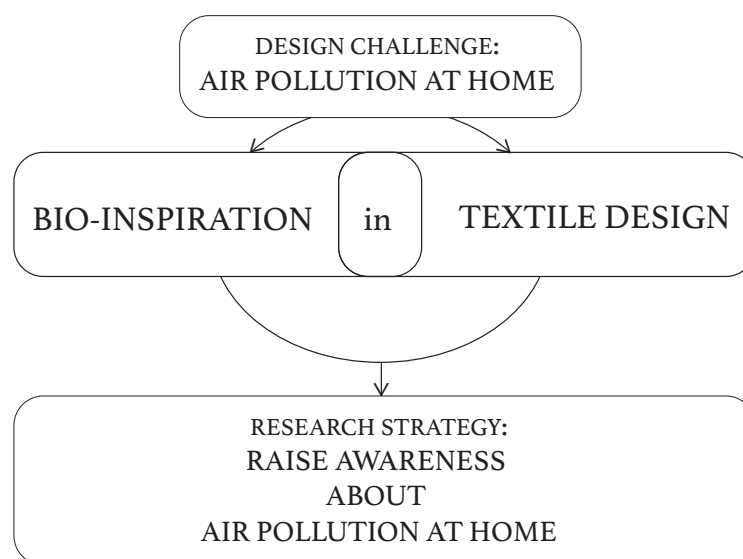


Figure 1:1 Situating research

At present, the mainstream approach to the issue of air pollution in the home environment is to diminish it by creating new products (e.g. devices that absorb volatile organic compounds [VOCs] or particulate matter in the air). This is the design approach that generates ‘less destructive, incrementally improved versions of existing products in ways that fit with the prevailing, corporate-led, growth based economic model’ (Walker, 2017, p. 52). This does not solve the problem, instead, it attempts to deal with it by making it ‘less bad’ (McDonough & Braungart, 2002). Using a new approach to tackle this challenge, this practice-led research looks at the role interactions with bio-inspired textile artefacts play in tackling the issue in the form of raising awareness about air quality in the home environment. Seen as a way to educate people about the problem of pollution and possibly influence future activities by being ‘the first step in the change process’ (Bartholomew et al., 2001 cited in Purtle & Roman, 2015, p. 1062), raising awareness is important because it has the potential to be a catalyst for generating change. Here, because awareness is raised through interaction with textile artefacts, a switch of power from the artefact to the inhabitant is generated, which results in turning the inhabitant into a participant, and shifting their passive behaviour into an active one. As a result, the approach developed within this research has the potential to be empowering.

Grant & Fox (2007, p. 78) argue that ‘“good design” implies aesthetic attractiveness, technical and practical competence and an innovative and appropriate approach to problem solving’, while Caan (2011, p. 121) writes that ‘design has always existed in the form of an intention, a deliberate action, or an intervention into an existing circumstance for the sole purpose of improving the human condition’ and as a result ‘holistic design can be realized only if the designer thinks in terms of both how to work from without (attending to aesthetic elements) and from within (addressing individual functional and experiential needs)’ (p. 135). Discussing interior design in particular, Caan (2011, p. 132) states that ‘the task of design is not limited to the creation of a few incidental or stand-alone objects. It is a comprehensive means of shaping the future of the entire built environment and every human interaction that takes place within it’. That leads to defining designer’s role as solving societal problems by ‘creating spatial, sensory, and visual solutions that, while beautiful, are fundamentally concerned with improving a person’s quality of life as broadly as possible (Caan, 2011, p. 124)’. Hill (2005) in Shove et al. (2007, p. 132) builds further this idea by arguing that the designer’s task is not to produce finalised artefacts but to build ‘products which people can adapt and shape to their own purpose’. Introducing three categories of designers (e.g. narcissistic, corporate and social), Grant & Fox (2007, p. 79) refer to the ‘social’ designer as the one that ‘examines how designs transmit messages, not only about products and about people but also about human relationships’, that is positive and empowering messages, as it was proven that consumers respond well to this kind of messages (Grant & Fox, 2007, p. 87). This theory supports the idea promoted in this research according to which design should not only be used for the purpose of coming up with incremental solutions to the problem of air pollution at home in the form of finalised artefacts, but is also able to address the problem using a different strategy, that of raising awareness about the issue.

In this research, a distinction is made between textile as a product design and textile as a tool in design communication. Since here the focus is on the latter, Andrew’s (2008) notion of ‘communicative textiles’ is relevant to this research. Andrew (2008, p. 34-35) defines ‘communicative textiles’ as textiles that have one or more of the following characteristics: ‘contain imagery that creates a visual narrative’, ‘contain typography that can be read to derive meaning’, ‘contains symbols, images or decorative motifs that have a specific meaning (even if this meaning requires specific knowledge or cultural experience to understand)’, ‘contain colours, textures or patterns which evoke a mood or feeling in the viewer’, ‘communicate meaning through what it is made from – i.e. the actual fabric and/or its tactility’, and ‘communicate meaning through its contextualization – i.e. what is made into and how or where it is shown’. In this research, the practice has the power to communicate meaning, and this it is achieved through the use of specific imagery, the colours and textures utilised as well as the materials the artefacts are made of.

Here, raising awareness is facilitated through bio-inspiration. Bio-inspiration is an approach which involves looking at nature for models that can be used as inspiration in design, and that here is used as a strategy to raise awareness about one of the challenges (e.g. air pollution) of our contemporary lives. This is a new way to work with bio-inspiration that complements the current bio-inspiration approaches (to tackling air pollution at home) which consists of creating products that prevent the production of polluted domestic air. Bio-inspiration is a term associated with biomimicry defined as ‘emulating nature’s time-tested patterns and strategies’ (Biomimicry Institute, 2019), however, in this research, bio-inspiration is different than biomimicry in two aspects. First, while biomimicry as described by Benyus (2002) and the Biomimicry Institute (2019) promotes the mimicking of nature

as a way to seek ‘sustainable solutions to human challenges’, the textile artefacts designed in this research are not primarily motivated by sustainability, instead, their main role is to raise awareness. Second, while biomimicry implies an accurate mimicking of the natural phenomena, bio-inspiration refers to looking at nature for inspiration in the design of textile artefacts. A term also associated with bionics and biomimetics, bio-inspiration, as understood in this research, is different than bionics and biomimetics. While they all are looking at nature as a model that can offer inspiration for the design of products, here, the study of nature seen as bio-inspiration informs design-driven innovation, while in bionics and biomimetics ideas from nature are translated into engineering-based innovation. When working with biomimicry, however, the approach can be design-driven or engineering-driven. Another concept that is important in this research is biophilic design, as the practice developed integrates principles of biophilic design.

This project has grown from my innate affinity to textiles and the educational experience in the area of printed textiles. I developed skills specific to the production of printed textiles through education at the undergraduate level as well as the masters level. At BA level I focused on the development of printed textiles for interiors. At MFA level, I focused on the development of conceptual textiles. This involved exploring a wide range of materials and processes, as a way to identify how textiles can acquire and communicate meaning and embracing interdisciplinary practice, specifically working with concepts from the social sciences (e.g. memory). These educational experiences which deepened my understanding of what a textile can be and the various roles (e.g. functional, conceptual) it can play in people’s lives, together with an unending interest in textiles, led to this project, which started from a wish to research what a textile created with a bio-inspiration approach can look like, and what can its purpose be. Up to this point, in the field of textiles, bio-inspiration/ biomimicry has been mostly applied using an engineering approach, therefore the focus has been on the function of the textiles developed. In contrast, in this research, the goal is to use my design skills, to approach this bio-inspired research from a textile design perspective and to place emphasis on the aesthetic qualities of the bio-inspired textiles developed; and last, to highlight the role that aesthetic qualities can play in the textile achieving its purpose, aesthetic qualities that refer to what the viewer is seeing, touching (feeling), smelling when engaging with a textile artefact, what Hekkert (2006 cited in Hekkert & Karana, 2014, p.6) named ‘the pleasure attained from sensory perception’.

The focus of this project evolved as the research progressed. The starting point of this research was the development of biomimetic textiles that absorb or counteract the effects of air pollution at home. However, as the contextual review on domestic air pollution was completed a new way to address the challenge (e.g. raising awareness) was identified, a way that held the potential for the elimination of the problem, and not only its reduction. Also, as the strategy for raising awareness became the interaction with the textile artefacts, this held the potential to empower the inhabitants. Last, as practice developed and the interaction with the textile artefacts became the strategy for raising awareness, the ritual-like qualities of the engagement that was created while interacting with the artefacts started to gain importance (Figure 1:2).

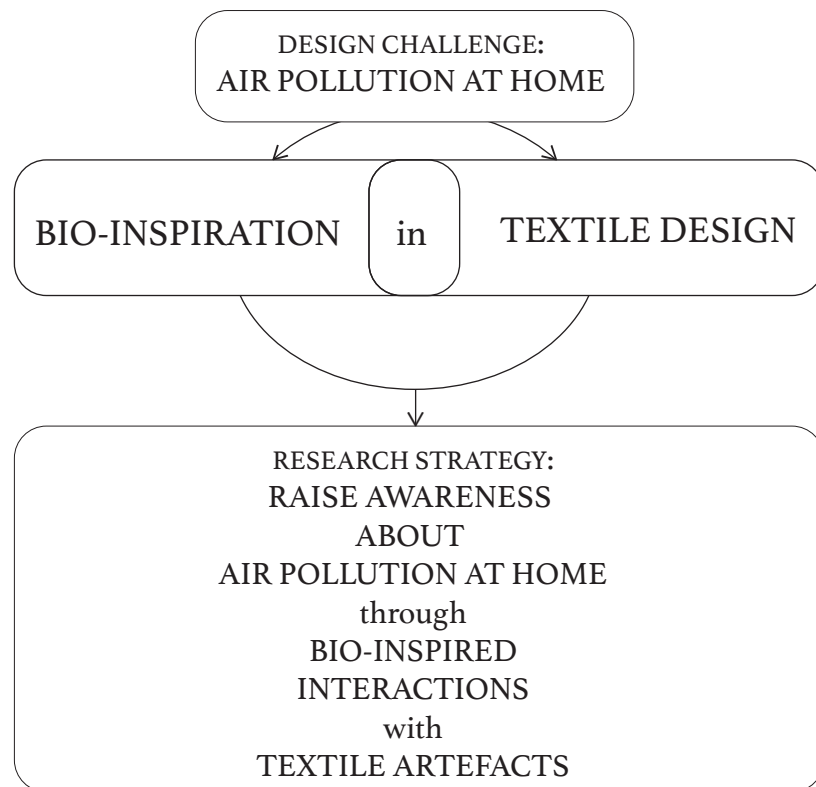


Figure 1:2 Situating research with details about the research strategy

The switch away from developing a textile that diminishes or counteracts the effects of pollution to developing a textile that raises awareness, or in other words the switch away from the functional to the aesthetic, and therefore the decision to not take the engineering high-tech approach which characterises the practice of design that addresses air quality at home, has to do with the value that it is given in this research to a poetic way of developing textiles, which involves using low-tech processes and incorporating slow interactions. Engagement with these textiles in the intimate setting of the home allows participants to enact a form of raising awareness seen as quiet activism (Pottinger, 2017). Working with textile materials and processes in this way led to the creation of a particular type of interaction, one that was slow, meditative and highly tactile, and as a result to a poetic way of raising awareness. A different medium and a different way of making would have led to a different result.

Please note that this research is written using the third person, exception being the times when I am discussing my own practice and I will use the first person.

1.2. Research aim and objectives

Aim

The overall aim of this research is to examine how bio-inspiration in textile design can inform the design of artefacts that raise awareness about air quality in the home environment.

Objectives

The aim yields the following objectives:

- Review data on indoor air pollution and indoor air quality and map the contemporary design practice on air quality, with a focus on design that raises awareness about air quality.
- Review the literature on bio-inspired design and the contemporary bio-inspired design practice.
- Search the scientific literature for a biological model that can be used as inspiration in the design process.
- Develop textile artefacts inspired by the biological model identified that have the potential to raise awareness about domestic air quality and test the textile artefacts.
- Establish guidelines for bio-inspired design that raises awareness about air quality and test the guidelines.

1.3. Methodology

This research enquiry is practice-led, where practice-led is understood as ‘research in which the professional and/or creative practices of art, design or architecture play an instrumental part in the inquiry’ (Rust et al., 2007, p. 11), and which is ‘concerned with the nature of practice and leads to new knowledge that has operational significance for that practice’ (Candy, 2006, p. 1). In practice-led research, the whole process of research includes the production, application, and evaluation of creative work (practice). Investigations with this approach use practice to understand and inform the research process, and the outcomes can take the form of principles, frameworks, guidelines, and so on (Candy & Edmonds, 2018).

The research aim and objectives are met by applying multiple research methods and techniques, including prototyping, sampling, reflection, adoption experiments, interviews, workshops, comparison, and visual mapping.

Frayling (1993) classifies design research as research *into* design, *for* design, and *through* design, where research through design (RtD), involves both understanding the process of design itself and developing new design artefacts/methods. This type of research as Stappers & Giaccardi (2019) write ‘indicates design activities that play a formative role in the generation of knowledge’ where the designerly contribution consists of ‘the development of a prototype (or artefact) that could be mistaken for a “product”, and that plays a central role in the knowledge-generating process’. This research follows the RtD process. Here, the RtD process employs prototypes/ designed objects in the form of interactive textile artefacts, as a means to generate knowledge within the field of research (Gaver, Dunne & Pacenti, 1999). Seen as research artefacts, the interactive textile artefacts developed principally, *Home Pharmacy*, *Remedial Landscape*, *Nest Engagement* (Figure 1:3) are ‘different than design practice artefacts in that the intent going into this research is to produce knowledge for research and practice communities, not to make a commercially viable product’ (Zimmerman, Forlizzi & Evenson, 2007, p. 499).

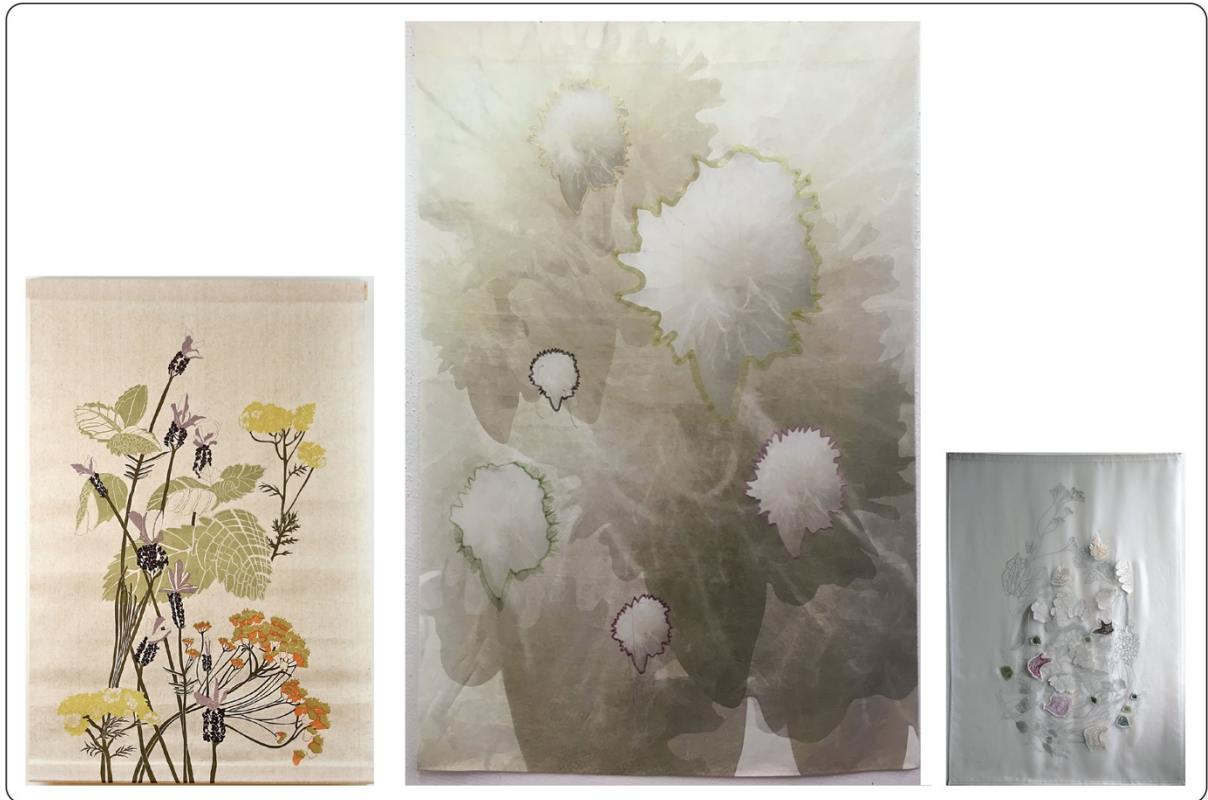


Figure 1:3 *Home Pharmacy, Remedial Landscape, and Nest Engagement*

1.4. Map of research

The research has been put together in two stages (Figure 1:4). Research stage 1 includes the generation and evaluation of the textile artefacts. Research stage 2 includes the formulation of the guidelines for bio-inspired design that raises awareness about air quality and testing the applicability of these guidelines by other practitioners (i.e., undergraduate students). The research concludes with the design and making of a final artefact, *Bio-inspired Awareness*, which works as a demonstrator and is intended to assist designers with the process of applying the guidelines.

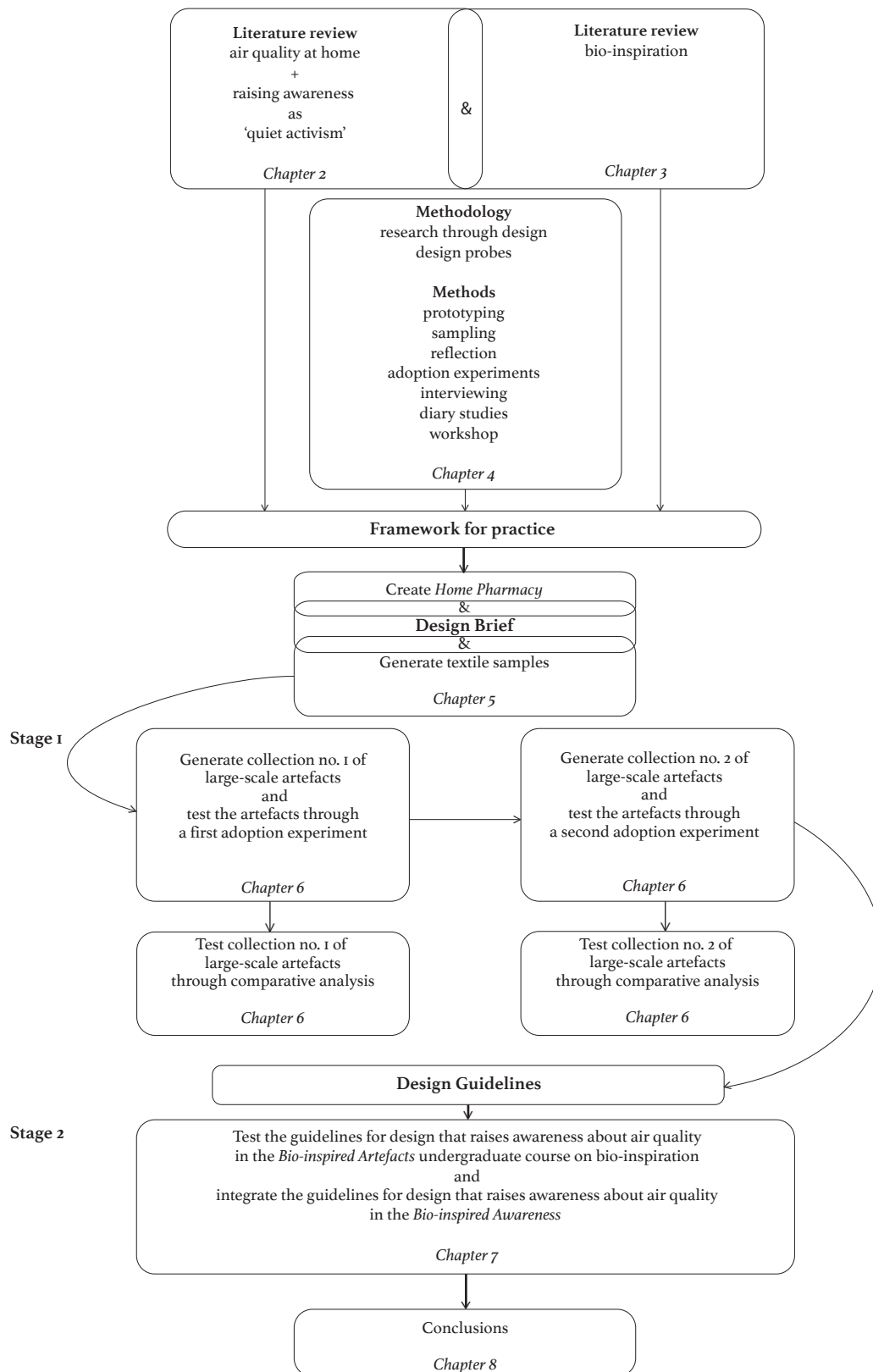


Figure 1:4 Map of research

1.5. Original contributions to knowledge

This thesis documents original contributions to knowledge in the fields of bio-inspiration and textile design as well as in relation to the methodology of devising cultural/design probes. This research brings one major contribution and six minor contributions to knowledge. This section is a summary of these contributions which are fully discussed and evidenced in chapter 8.

1.5.1 Major contribution

The most valuable contribution this research brings is ***the bio-inspired textile poetic approach to raise awareness about air quality at home as a quiet activism practice***. The uniqueness of this approach lies in that in addition to raising awareness, it also empowers people to improve their homes and it contributes to wellbeing at home. The poetic approach materialized through a set of guidelines for designing bio-inspired artefacts that raise awareness about air quality at home accompanied by visual documentation of a physical example of a bio-inspired design that raises awareness about air quality at home. This design demonstrates how the guidelines can be applied in design and is intended to assist the designers with the process of applying the guidelines. For details about this contribution see section 8.2.1, p. 190.

1.5.2 Minor contributions

Additionally, this research brings the following minor contributions to knowledge: (1) ***utilising bio-inspiration as a strategy to raise awareness*** (see section 8.2.2, p. 192); (2) ***taking inspiration from the biological model at the function level and the symbolic level*** (see section 8.2.2, p. 192); (3) ***establishing a connection between the process of taking inspiration from nature at the symbolic level and the incorporation of the biophilic design principles in the design of artefacts*** (see section 8.2.2, p. 192); (4) ***further clarifying what bio-inspiration in the context of design inspired by nature is*** (see section 8.2.2, p. 192); (5) ***introducing a new category of bio-inspired textiles, where the focus is on their aesthetic qualities, different than the bio-inspired engineered textiles which dominate the field*** (see section 8.2.2, p. 192); and (6) ***adding a new role to the cultural/design probes as a form of engagement, possible agent of change and as a tool to empower people*** (see section 8.2.2, p. 193).

1.6. Thesis summary

The first chapter sets out the introduction to this research, as well as the main aim and objectives, and the thesis structure.

The second chapter starts with a short history of domestic air pollution and continues with an analysis of official reports on domestic air pollution, which identifies raising awareness as the approach for dealing with the issue. The chapter also discusses that in this research raising awareness is seen as a form of quiet activism, generated by a poetic textile practice. The chapter ends with a critical analysis of the contemporary design practice on air quality, with a focus on design that raises awareness about air quality.

The third chapter discusses the theory and practice of bio-inspiration. It starts with presenting the theory on bio-inspiration and related fields (e.g. biomimetics and bionics, biomimicry, biophilic design, biodesign and bio-integrated design) and continues with a critical analysis of the bio-inspired practice with a focus on textiles, followed by a review of the broader field of contemporary bio-inspired design practice. It concludes with a literature review on the bio-inspiration design process, with articulating the steps of the process used in this research, and with identifying the biological model to be used as inspiration for practice.

The fourth chapter begins with discussing the RtD process and continues with presenting the methods and tools used during every phase of the design process, as well as the theoretical underpinnings of these methods. The research methods and techniques utilised in this research and discussed in this chapter include prototyping, sampling, reflection, adoption experiments, interviews, workshops, and comparison. The chapter ends with presenting reflection and visual mapping as tools used throughout the research.

The fifth chapter starts with a description and analysis of *Home Pharmacy*. As the first bio-inspired textile artefact developed in this research, *Home Pharmacy* establishes the procedure for designing and making the upcoming textile artefacts, and its analysis outlines a series of considerations for practice. Then, it introduces the design brief which is informed by the results of the analysis of *Home Pharmacy*. The remainder of the chapter illustrates the development of practice (i.e., textile samples) by focusing on its two aspects: the design and the making. The practice is drawing upon the researcher's detailed knowledge of textile design with a particular emphasis on surface design, and a focus on printing, embroidery, and crochet.

The sixth chapter discusses how seven textile artefacts have been created following the procedure for designing and making established in the previous chapter and how they were evaluated. It describes the way the adoption experiments have been carried out and the interpretation of the qualitative data that was generated at the end of the two adoption experiments. The discussion about the adoption experiments ends with an interpretation of data collected nine months after the second adoption experiment, as a way to identify what long term impact the second adoption experiment might have had. The chapter also includes an evaluation of the textile artefacts in the form of a comparison with the contemporary design practice that raises awareness about air quality, as a way to highlight the uniqueness of the approach developed in this research.

The seventh chapter establishes the guidelines for bio-inspired design that raises awareness about the health of the home environment, with a focus on air quality, and discusses the testing of these guidelines within an undergraduate course (i.e., design workshop) on bio-inspiration. It ends with discussing *Bio-inspired Awareness*, a final textile artefact, which demonstrates how the guidelines can be applied in design and is intended to assist the designers with the process of applying the guidelines.

This research concludes with the eighth chapter which includes a summary of the research, the contribution to knowledge, and future research directions.

2.Contextual review: air pollution at home and raising awareness

2.1. Literature review: air pollution at home

This section establishes the historical and contemporary context concerning air pollution at home through a literature review, with a focus on the reports from organisations like WHO, United States Environmental Protection Agency [US EPA], and European Commission Scientific Committee for Health and Environmental Risks [EC SCHER].

2.1.1. Short history of domestic air pollution in Europe

In Europe, the issue of domestic air pollution appeared after the Second World War and has its roots in the development of new materials used in the construction of homes and the determination to preserve energy (Baker-Laporte, Elliot & Banta, c2008). In the 1970s in response to the extensive use of synthetic materials in the construction of industrialised buildings, Bau Biology (Baker-Laporte, Elliot & Banta, c2008) emerged (in the field of Architecture) in Germany. The term Bau Biology or Building Biology comes from 'Bau Biologie' a term first coined by Hubert Palm and translated in English in 1987 by Helmut Ziehe. The main idea promoted by Bau Biology is that the construction of homes and workplaces should closely consider the types of building materials and construction methods used in order to positively impact human health. As a way to achieve that Bau Biology built a set of principles based on natural laws (e.g. using natural, non-toxic materials with the least amount of radioactivity as a way to create healthy, chemical-free environments) and used these principles as guidelines in the design of new buildings (Institute of Building Biology + Sustainability, 2019). In the early 1990s, the green building movement has emerged, which led to improved indoor environmental quality. The green building movement advocates not only for improving construction practices so that buildings are less costly and last longer, but also for protecting the natural resources and improving the indoor environment so that people can live a healthier life (Kubba, 2012). Environmental quality is 'an umbrella term that refers to the sum of the properties and characteristics of a specific environment and how it affects human beings and other organisms within its zone of influence' (Terrapin Bright Green, 2014, p. 14). In this context, better indoor environmental quality means better air quality, acoustics, increased thermal comfort, and so on. Recently, because of issues such as climate change, new building legislations have informed the design of homes. As a result, the homes built since the 2000s place great emphasis on airtightness and thermal performance, which while reducing costs, are leading to a lack of proper ventilation and a decline in air quality (UK Research and Innovation, 2017). And so, domestic air pollution continues to have damaging effects on human health as the study *Environmental burden of disease associated with inadequate housing* (WHO, 2011) reports.

2.1.2. Analysis of the official reports on domestic air pollution

In general terms, the concept of domestic air pollution refers to the contamination of air in the home environment by multiple factors leading to negative effects on the inhabitants' health and wellbeing. Air pollution at home is the result of two predominant factors: biological (e.g. filamentous fungi [mould], house dust mites, bacteria, pollen); and chemical (e.g. VOCs in the form of formaldehyde, carbon monoxide, nitrogen dioxide, benzene, and naphthalene). The main biological

factors are to be found in dust that is to be found on surfaces (and grow once moisture is available), while main sources of chemical pollution are domestic products (e.g. air fresheners, paints, hobby supplies, cleaning products), furnishings, and building materials. In addition, construction practices, the properties of the buildings (which lead to humidity, and poor ventilation), and occupant behaviour (WHO, 2009; US EPA, 2019; EC SCHER, 2007) are listed as one of the main causes associated with indoor air pollution.

In 2019 European Environment Agency (EEA) identified outdoor air pollution as ‘the single largest environmental health risk in Europe’ (EEA, 2019). This is concerning, considering the levels of outdoor air pollution have a great impact on the quality of indoor air (EEA, 2013) where humans spend approximately 90 percent of their time, and inside pollutant levels are often higher than those outside (EC SCHER, 2008). Exposure to polluted indoor environments may lead to serious health complications, which include asthma (WHO, 2009), liver and central nervous system damage (US EPA, 2019), and even cancer (EC SCHER, 2007). Additionally, prolonged exposure to air pollution is likely to have a profound and irreversible negative impact on occupants’ health and wellbeing (WHO, 2009; WHO, 2010; US EPA, 2019).

Apart from identifying the main sources of pollution, what causes them and their health effects, this review also revealed that the main challenge when dealing with this issue is the combined exposure, that is the fact that in the home environment various biological and chemical factors mix. This is the main challenge since there is no solid research on the interaction of biological and chemical elements at home and the combined effects of indoor air pollutants on human health (EC SCHER, 2007). As a result, there is no feasible way of targeting the effect of these mixtures of pollutants, because even if we are to design products that target individual biological and chemical factors, or a combination of these factors, it would be impossible to target the myriad of combinations existent in the home. Therefore, the main recommendation official sources make is to reduce exposure (EC SCHER, 2007).

2.1.2.1. Mapping of the findings of official reports on domestic air pollution

Figure 2:1 summarises the WHO, US EPA, and EC SCHER reports findings and lists current solutions to the problem of air pollution, organised as solutions that designers, in general, could pursue (‘what can be done’ section) and solutions that could be pursued in this research (‘what I can do’ section).

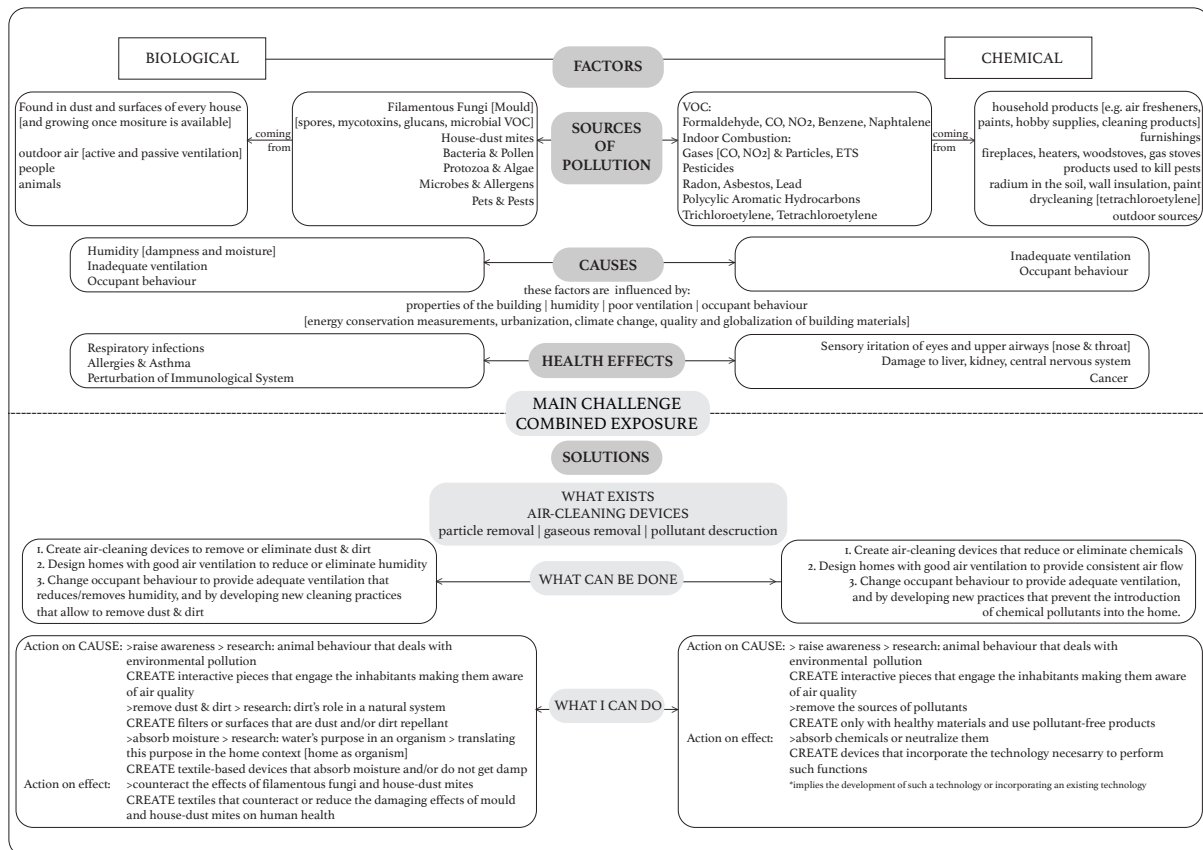


Figure 2:1 Map of the findings of the reports on indoor air quality and of possible solutions to address the issue

2.2. Literature review: raising awareness as quiet activism

When dealing with an issue there are two approaches to solving it: acting on the effect or the 'less bad' (McDonough & Braungart, 2002) approach (i.e., reducing the problem) or acting on the cause (i.e., eliminating the problem). Reducing exposure to indoor air pollutants fits into the second approach, and is also the approach followed in this research. Here, the way in which reducing exposure is aimed at is by raising awareness about the issue. Raising awareness about domestic air quality is seen as a pragmatic way that can work effectively in preventing the generation of air pollution at home since the ultimate aim of raising awareness is to achieve long-lasting behavioural changes (Climate-ADAPT, 2015). By being considered 'the first step in the change process' (Bartholomew et al., 2001 cited in Purtle & Roman, 2015, p. 1062), raising awareness is important because it may be the catalyst for generating change. In the analysis of the official reports on domestic air pollution, (see section 2.1.2, p. 34) occupant behaviour was identified as being able to influence the levels of chemical and biological pollution at home in that the lack of a proactive behaviour in regard to maintaining and creating a healthy home increases the level of polluted domestic air. Therefore, by raising occupant's awareness about air quality at home, the disengaged (passive) behaviour of the occupants could eventually change to an engaged (active) one. As a result, the occupants can end up playing an active role at home which could directly influence the decline of domestic air pollution. In addition, utilising raising awareness as an approach to tackling the issue of air pollution thus increasing public awareness about air quality, can also work towards making

countries to create legislations about domestic air quality. At the moment legislations tend to vary globally, and there are even countries (e.g. the UK) where there are no legislations relating to emissions from products (e.g. flooring products and adhesives which emit VOC's) inside buildings (Walport, 2016).

Recently, *Health and wellbeing in homes* (UK Green Building Council, 2016) and *Better homes, better air, better health* (ARCC, 2017) reports acknowledge the importance of domestic air pollution, and offer recommendations for ways to tackle it. Raising awareness is among the strategies they offer for addressing the problem. However, recommendations include raising awareness through mass-media campaigns, public lectures, or awareness days, and no recommendations for addressing this issue from a design perspective are included; even though, as it was mentioned previously, design can play a significant role in improving people's lives through communicating positive and empowering messages (Grant & Fox, 2007), which is the case of design for raising awareness. In addition, because the approach utilised in this research involves working with bio-inspiration and textiles as a way to raise awareness, a new approach to design for raising awareness emerged, which only adds to the current making the invisible visible strategy to be discussed in section 2.3, p. 39.

The public understanding of raising awareness, as Liz Feld, the president of the non-profit advocacy organisation Autism Speaks, describes it is 'sending a message, getting attention, and getting people to talk about the issue' (Beck, 2015). Awareness is often discussed in the context of mindfulness. The word mindfulness comes from Pali language word 'sati' and signifies 'to remember'. The practice of mindfulness has its roots in the reflective traditions of the East, and it has been named 'the heart' of Buddhist meditation (Thera, 1962 cited in Kabat-Zinn, 2003). Mindfulness, however, goes beyond the idea of meditation, to incorporate 'a state of consciousness' (Brown & Ryan, 2003, p. 824). According to Brown, Ryan & Creswell (2007), mindfulness is central to human life as it is deeply connected to the core activities of consciousness: awareness and attention, where awareness refers to 'the conscious registration of stimuli' (Brown, Ryan & Creswell, 2007, pg. 212) and attention refers to 'taking notice' of something when a stimulus is strong enough (Thera, 1973 cited in Brown, Ryan & Creswell, 2007). Because this research is concerned with the notion of awareness, the work is not analysed using a mindfulness lens, instead the focus is on awareness, where awareness is referred to as 'the state of being aware of something' (Merriam-Webster dictionary, 2016), of having knowledge and understanding that something exists.

2.2.1. Quiet activism

In discussing quiet activism, Pottinger (2017, p. 216) defines it as 'modest, embodied acts, that often entail processes of production or creativity, and which can be either implicitly or explicitly political in nature', and as 'a form of engagement that emphasises embodied, practical, tactile and creative ways of acting, resisting, reworking and subverting' (p. 217) that is characterised by gentleness, slowness and subtlety. When engaged in quiet activism the emphasis is on the quiet power of the small and overlooked actions and practices, and on the practical and tangible acts. This is a form of activism that involves 'quiet, subversive and significantly, productive methods of engagement and action' (p. 219) that are undertaken by participants with 'joy, exuberance, generosity, care and skill' (Smith and Jehlicka, 2013, p. 156 in Pottinger, 2017, p. 217).

In this research, raising awareness is achieved through slow interactions with textile artefacts, engagement that could be interpreted as a form of quiet activism, in that the focus is on small actions performed repeatedly in the domestic space, whose purpose is to raise awareness about the issue of air pollution, not verbally, nor loudly but in an active yet gentle way.

Because quiet activism involves interaction, the notion of interactive design is relevant to this research. According to Shedroff (2001) interaction design focuses on designing the interactivity between a product and its participants. When reviewing the literature, interaction in design is commonly associated with human-computer interaction (Morridge, 2006). Buchanan (2001, p. 11) however clarifies:

‘There is a common misunderstanding that interaction design is fundamentally concerned with the digital medium. It is true that new digital products have helped designers focus on interaction and the experience of human beings as they use products. However, the concepts of interaction have deep roots in twentieth-century design thinking and have only recently emerged from the shadow of our preoccupation with visual “symbols” and “things”’.

Buchanan (2001, p. 11) further explains that interaction design focuses on ‘how human beings relate to other human beings through the mediating influence of products. And the products are more than physical objects. They are experiences of activities or services, all of which are integrated into new understanding of what a product is or could be’. Here, the principles of interaction design are applied to the creation of interactive physical (non-digital) objects (i.e., artefacts). Even though the design of artefacts follows the bio-inspiration process, which informs the type of interactive textiles created, when designing the interaction, emphasis is paid not only to how something feels or looks, but also how it works, ‘how elegantly something is done, how interaction flows, and how well the content fits in’ (Fallman, 2008, p.8).

Here, interaction is the context in which awareness occurs, and design for raising awareness is the outcome of interaction design.

In addition to interaction design, as air pollution is a social problem caused by human behaviour, the notion of social design is also relevant to this research. According to IDEO (2015) social design is about working with the community to facilitate conversations and meaning through the contributions of ideas, beliefs and rituals, as a way to come up with solutions to contemporary challenges. Solutions that are simple to use, to construct, to maintain and to dispose of. In this sense a social design project which can take the form of an intervention or performance can give agency to the weak and form to the silenced. Because the end goal of this type of design is to generate long lasting societal changes, it fits into the umbrella of design for change. In this research however, no conversations were facilitated with a particular community, nonetheless the purpose of the work is to give agency to inhabitants and empower them to improve their homes.

2.2.1.1. Poetic textile practice

The main tools of quiet activism are the textiles that are created as a result of the mindful way of working with textile materials and processes. Discussing craft, Valentine (2011, p. 285) states that it is 'often misunderstood as a form of skilful making', and little to no emphasis is placed on the processes of thinking and making associated with it. However, while engaged in craft making a 'suspension of thought allows a pattern to evolve, providing an individual with a picture, which depicts the interrelationship(s) between different and often contrasting elements of an idea.' (Valentine, 2011, p. 286). Valentine looks at craft practice through the lens of Mindful Inquiry, which is connected to the philosophy of mindfulness, seen as 'an awareness and understanding of one's own mind and how it influences one's perceptions and actions' (2011, p. 284). Applied to craft making Mindful Inquiry allows one to understand 'how the mind's eye synthesises visual, oral, sensory and written information, and the process by which ideas are transposed into an individual's personal philosophy' (Valentine, 2011, p. 286). In the context of this research, the way the practice has been developed involves attention and awareness to the problem being addressed, that is raising awareness. The time spent making allowed for an investigation of how the issue can be tackled using textiles as a medium and bio-inspiration as an approach. As a result of working in this manner, which involved using hand making and low-tech textile processes (all slow processes which allowed time for reflection), textiles, which incorporated slow and sensorial type of interactions, were developed. Engaging with these textiles led to a poetic type of strategy for raising awareness, that is slow, intimate and meditative.

2.3. Review of contemporary practice: design for air quality

A review of contemporary practice was done to understand the current landscape of practice and where this research is positioned, and to demonstrate the gap in the practice of design that raises awareness about indoor air quality (with a focus on domestic air quality). This review was assisted by two mapping exercises and was based on the review of existing literature and of a sample of design projects for air quality. The design projects have been found:

- through a search of the world-wide-web using keywords, for example 'designs for air quality', 'designs for air quality at home', 'air pollution projects', 'domestic air pollution projects'; 'design that raises awareness about air quality';
- through viewing of design exhibitions and reviewing of exhibition catalogues; and
- through reviewing of design journals articles and books.

2.3.1. Mapping of design practice on air quality

The contemporary design practice on air quality was mapped with two goals. First, to gather a broad enough scope to illustrate where in this practice landscape this research is located. Second, to demonstrate the gap in knowledge, as only one design project that raises awareness about domestic air quality has been identified.

In this exercise, the projects collected have been organised in relation to their purpose following two approaches to tackling the issue of air quality: to improve air quality or to raise awareness about air

quality. When practically dealing with the issue of indoor air pollution, there are two main ways to solving it: acting on the effect and acting on the cause of the issue. The first effect-oriented, symptomatic, approach focuses on reducing or counteracting the effects of pollution by targeting a certain biological or chemical factor, or sometimes a combination of these factors. However, this approach is limiting in that it aims at reducing the effects of pollution, and it does not act on its causes (EC SCHER, 2008). This approach is at times unsuccessful since no quantitative health-based guidelines values or thresholds can be recommended for an acceptable level of contamination with microorganisms (WHO, 2009). Most of the designs that improve indoor air quality are following this approach. Among these are purifiers like *Andrea*¹ (Inhabitat, 2014) by Mathieu Lehanneur and David Edwards of Harvard University that uses indoor plants to filter air in order to counteract the effects of domestic pollution; *Molekule*² (Molekule, 2017) that breaks down pollen and dust at a molecular level by applying a new technology called Photoelectrochemical Oxidation, which features a filter coated in nanoparticles (that is different than the HEPA filter most purifiers use to collect and store pollutants); *Sense*³ (Claesson Koivisto Rune, 2012) by Claesson Koivisto Rune that is equipped with the heap silent plus air technology, so the fan uses less electricity than a low-energy lightbulb while being virtually silent; *Plain Air*⁴ (Norguet, 2010) by Patrick Norguet that uses a Photo Catalysis Oxidation system to filter out germs and particles; and *Pure*⁵ (Pu Yan, 2017) by Victor Pu Yan a sustainable air purifier that uses a filter that is able to be produced by just one material as opposed to conventional air filters which are usually made up of up to 6 different materials all bounded by glue, a filter that is made using an origami structure and a heat press process. Additionally, there are carpets like *AirMaster*⁶ (Tarkett, 2019) by DESSO that improves air quality by trapping and containing dust particles at a higher rate than normal carpets do (the patented technology that has been specifically engineered for this product is said to be eight times more effective at absorbing fine particles than hard floors and four times better than standard carpet); curtains like *Gunrid*⁷ (IKEA, 2019) by IKEA that has its surface coated with a photocatalyst mineral that causes pollutants in the air to break down when (natural and artificial) light shines through it; and concept designs like *Deterritorialized Milieus*⁸ (Rahm, 2009) by Philippe Rahm, a climate-related performance installation with three elements: a dual-flow air ventilator, chairs of different heights and a lamp, where the ventilator is made of various types of wood that absorb humidity and also produce air with various fragrances (similar to the way the air in Paris smelled before the problem of air pollution started).

¹ *Andrea*. Available from: <<https://inhabitat.com/video-andrea-air-purifier-uses-a-plant-to-clean-the-air-in-your-home/>>.

² *Molekule*. Available from: <<https://molekule.com>>.

³ *Sense*. Available from: <<http://www.claessonkoivistorune.se/projects/sense/>>.

⁴ *Plain Air*. Available from: <<https://www.patricknorguet.com/en/project/plain-air>>.

⁵ *Pure*. Available from: <<https://www.victorpuyan.com/purifier>>.

⁶ *AirMaster*. Available from: <https://professionals.tarkett.com/en_EU/node/desso-airmaster-5076>.

⁷ *Gunrid*. Available from: <<https://ikea.today/meet-gunrid-air-purifying-curtain/>>.

⁸ *Deterritorialized Milieus*. Available from: <<http://www.philipperahm.com/data/projects/deterritorializedmilieus/index.html>>.

The second cause-oriented, preventative, approach focuses on making conscientious choices of designing a healthy home by using pollutant-free materials and/or adopting behaviours that help maintaining a healthy air, for example not bringing into the home items that might pollute its air and/or regularly ventilating the home. WHO (2010) and most recently companies (for example, ARUP [ARUP, 2020] an independent firm that provides engineering, architecture, design, planning, and consulting services for all aspects of the built environment) emphasise the same cause-oriented approach recommending reducing pollution by controlling the primary factors that determine their presence in the air, that is their sources, arguing that measures taken to control air pollution (for example, controlling the sources of pollutants rather than focusing on individual pollutants) frequently lead to a reduction in the concentration of more than one pollutant (WHO, 2010). In this sense, there are products and buildings that prevent the production of air pollution at home, all of them taking inspiration from models in nature. Among these there is *Aquapel*⁹ (Nanotex, 2017) by Nanotex, a fabric that mimics the surface of the lotus flower and thus is able to repel water and to clean itself; *PureBond*¹⁰ (Columbia Forest Products, 2017) wood adhesive created by Columbia Forest Products that is inspired by the blue mussel due to its capacity of producing natural adhesives, thus is a soy-based wood glue that does not use formaldehyde; and *Eastgate Centre*¹¹ (Ask Nature, 2016) in Harare Zimbabwe by architect Mick Pearce and ARUP that is inspired by the self-cooling mounds of African termites, thus has no conventional air-conditioning or heating, yet stays regulated year-round. Raising awareness also fits into the cause-oriented design approach, however, only one design (e.g. *Air Pollution Toile*¹²) that raises awareness about indoor air quality has been identified. *Air Pollution Toile* (UAL Research Online, 2018) by Lucy Kimbell is a concept for a wallpaper that gradually changes over time in response to common pollutants in the home, such as carbon monoxide, nitrogen dioxide and particulate matter. As a result, after being exposed to high levels of pollutants for several years the wallpaper changes from white to colour and reveals images that show the physiological impact of air pollution such as lung disease, stroke, cancer and dementia.

The projects discussed above were placed into a matrix (Figure 2:2) in which the contemporary designs on air quality were organised in relation to their purpose, that is to improve air quality or to raise awareness about air quality. In addition to the two areas on design for indoor air mentioned, Figure 2:2 also includes two areas on design for outdoor air. The main purpose of including the area on design that improves outdoor air was limited to illustrating the broad scope of the practice on air quality, as a result, no analysis of this section will be provided. The area on design that raises awareness about outdoor air was introduced as a way to illustrate by contrast the lack of design that raises awareness about indoor air, and second, as a way to understand the contemporary landscape of design for raising awareness. This last area is discussed in-depth in the next section.

⁹ *Aquapel*. Available from: <<http://nanotex.com/aquapel/>>.

¹⁰ *PureBond*. Available from: <<https://www.columbiaforestproducts.com/library/technical-documents/purebond/>>.

¹¹ *Eastgate Centre*. Available from: <<https://asknature.org/idea/eastgate-centre/>>.

¹² *Air Pollution Toile*. Available from: <<http://ualresearchonline.arts.ac.uk/13410/>>.

	DESIGN THAT IMPROVES AIR QUALITY	DESIGN THAT RAISES AWARENESS ABOUT AIR QUALITY
INDOOR AIR		
OUTDOOR AIR		

Figure 2:2 Mapping of contemporary design practice on air quality

2.3.2. Analysis of design practice that raises awareness about air quality

Even though the focus of this research is the development of design that raises awareness about domestic air quality because of the limited number of projects that raise awareness about indoor air, this analysis is mostly focused on design works that raise awareness about outdoor air. The criteria for the analysis of these projects were:

- the shape the project took;
- the strategy that the project adopted in drawing people's attention (e.g. playing on people's fears) and the way to achieve that (e.g. by illustrating the dangers of pollution);
- the materials and processes the project used (with a focus on textile materials and processes).

In addition to using these criteria to analyse the contemporary practice on design that raises awareness, these criteria will also be used for the comparative analysis undertaken in the evaluation of practice stage (discussed in section 6.3, p. 152) where the practice developed through this research will be analysed in comparison to the contemporary practice that raises awareness about air quality.

Next, the reasons behind choosing each criterion will be presented as well as the key findings of this analysis.

In regard to the first criterion the focus was on looking into the shape each project took and the setting in which each project existed as a way to emphasise the need for this type of approach to tackle the issue of pollution and to illustrate once again the gap in practice. There are two findings drawn from this. The first finding is that the visual language these projects use makes them accessible to a large number of people and reach many more people than organisations and institutions do. This visual language involves raising awareness not through abstract numbers or graphs, but by direct experience, which goes beyond communicating science in a technical, sometimes hard to understand and not the easiest to access way (similar to the language organisations like WHO, US EPA, and EC SCHER and institutions like Institute for Health Metrics and Evaluation and Air Quality Index use). The second one is that there is a lack of focus on raising awareness about indoor air as there is only one project that raises awareness about air pollution at home (e.g. *Air Pollution Toile*), with most projects raising awareness about outdoor air, and taking the form of public projects that exist in outdoor spaces. Such outdoor projects include: *Breathe*¹³ (Global Street Art, s.d.) by Georgian street artist known as Dr. Love, a piece that uses the medium of a black and white stencil to create a rendering of the situation in which we may end up in case nothing will be done in regard to the issue of air pollution; *Particle Falls*¹⁴ (Eco-Public Art, 2010) by Andrea Polli and Chuck Varga, an installation that visualises in real-time the level of outdoor air pollution caused by particulate matter; *Smog Tasting*¹⁵ (The Centre for Genomic Gastronomy, 2011), a performance by The Centre for Genomic Gastronomy which addresses the problem of outdoor air pollution in Indian cities; *Catalytic Poetry*¹⁶ (Armitage & Ryan, 2014), a collaboration between the poet Simon Armitage and the chemist Tony Ryan, consisting of a printout of Simon Armitage's poem 'In Praise of Air' on a 10-meter by 20-meter piece of material capable of absorbing the pollution from 20 cars every day; *Light Creature*¹⁷ (Requena, 2015) façade of Hotel WZ Jardins in Sao Paolo by Guto Requena Studio that reflects in real-time outdoor air quality levels through changes in colour; *Velo2*¹⁸ (Loop.PH, 2016) by the London-based studio Loop.PH, a piece in Taipei comprised of a pair of 'lungs' that changes colour in response to air quality; the performance by a Chinese artist known as Brother Nut¹⁹ that spent 100 days collecting dust from Beijing's polluted air with a Hoover and turned it into a building block (Buckley & Wu, 2015); the installation by Xiao Zhu²⁰ a Chinese company that used factory smoke (China's biggest cause of pollutants) as a medium to illustrate

¹³ *Breathe*. Available from: <<http://globalstreetart.com/images/2hduwzf>>.

¹⁴ *Particle Falls*. Available from: <<http://eco-publicart.org/particle-falls/>>.

¹⁵ *Smog Tasting*. Available from: <<http://genomicgastronomy.com/work/2011-2/smog-tasting/>>.

¹⁶ *Catalytic Poetry*. Available from: <<http://www.catalyticpoetry.org/>>.

¹⁷ *Light Creature*. Available from: <<https://gutorequena.com/light-creature/>>.

¹⁸ *Velo2*. Available from: <<http://loop.ph/portfolio/velo2/>>.

¹⁹ Performance by Brother Nut. Available from: <<https://www.nytimes.com/2015/12/02/world/asia/beijing-smog-air-pollution-artist-brick.html>>.

²⁰ Performance by Xiao Zhu. Available from: <<https://www.designboom.com/art/xiao-zhu-air-pollution-project-china-06-11-2015/>>.

dangers of air pollution (Design Boom, 2015); *Delhi Lung*²¹ (Munoz, 2016) by Lucas Munoz that works as a printer, where the ink is the pollution particles in the air and the paper is a piece of fabric; *Smog Shades*²² (Xin, 2017) by Huachen Xin that aims to visualize air pollution in public places in order to achieve social impact; *Pollution Pods*²³ (Pinsky, 2018) an installation by Michael Pinsky made of five interconnected geodesic domes that contain recipes emulating the presence of ozone, particulate matter, nitrogen dioxide, sulphur dioxide and carbon monoxide which pollute Tautra (in Norway), London, New Delhi, Sao Paulo and Beijing; *Totemy Towers*²⁴ (Dezeen, 2019) in Poznan, Poland by designer Alicia Bjala and architect Iwo Borkowicz that is comprised of several handmade carved and painted wooden towers that communicate statistics about environmental issues (i.e., plastic pollution, air pollution, deforestation); and the UTEC billboard²⁵ (UTEC, 2014) by UTEC University in Peru, an air-purifying billboard situated next to a construction site in Peru that cleans 3.5 million cubic feet of pollution per day, with a text on it that describes what its function is. Additionally, there are a number of pieces in public gallery spaces, pieces like *Acid Rain*²⁶ (Axis Gallery, 2005-2009) by Bright Ugochukwu Eke, made of thousands of hanging plastic bags that are filled with carbon dust (which choked the inhabitants of the delta region of Nigeria); *Smoke Cloud*²⁷ (De Cupere, 2013) by Peter de Cupere, a cloud-like piece that confronts the viewer with the smell of air pollution in a different context (i.e., gallery) than the one in which people are used to experience it (i.e., on the street); and *Esmog Data* (Jaramillo Arango, 2018) by Julian Jaramillo Arango that explores the visualisation and sonification of urban environmental data, thus it displays through sound and computer graphics the concentration of toxic gases determining air quality index, such as carbon monoxide, carbon dioxide, nitrogen dioxide, ozone and particulate matter (PM10).

In regard to the second criterion, the focus was on analysing the strategy each project used in drawing people's attention and how they achieved that strategy, as a way to identify if there is one single strategy designers are using (and if not what is the range) and if there are any projects using bio-inspiration as an approach, as a way to demonstrate how the thesis contributes with a new approach for raising awareness about air pollution. There were two findings that came out. First, it was found that artists and designers use a wide range of strategies for drawing the public's attention to the issue of air pollution. One of these strategies involves using activism to raise public awareness of air pollution and the dangers associated with it and is utilised in projects like *Breathe, Smog*

²¹ *Delhi Lung*. Available from: <<http://www.lucasmunoz.com/site/project/php?id=399>>.

²² *Smog Shades*. Available from: <<https://www.huachenxin.com/>>.

²³ *Pollution Pods*. Available from: <<http://www.michaelpinsky.com/project/pollution-pods/>>.

²⁴ *Totemy Towers*. Available from: <<https://www.dezeen.com/2019/07/01/alicja-bjala-iwo-borkowicz-totemy-towers-baltyk/>>.

²⁵ UTEC billboard. Available from: <<https://www.utec.edu.pe/en/news/utec-surprises-again-billboard-purifies-air>>.

²⁶ *Acid Rain*. Available from: <http://www.axisgallery.com/Axis_Gallery/Bright_Ugochukwu_Eke_Albums/Pages/Acid_Rain,_2005-2009.html>.

²⁷ *Smoke Cloud*. Available from: <http://www.peterdecupere.net/index.php?option=com_content&view=article&id=164:smoke-cloud-in-the-importance-of-being&catid=1:exhibition-news&Itemid=98>.

Tasting, the installation by Xiao Zhu, and the performance by Brother Nut (all discussed previously). Another strategy consists of offering viewers visual experiences by changing the colours in response to changes in the level of pollution in the air as illustrated in projects like *Light Creature* and *Velo2* (both discussed earlier), as well as *Aerochromics*²⁸ (Bentel, 2016) and *PHNX*²⁹ (The Unseen, 2013). *Aerochromics* by Nikolas Bentel is a collection comprised of three cotton shirts that are printed with a dye that changes colour in response to air pollution or radioactivity; each piece is named after and features a pattern inspired by the pollutant it reacts to: Carbon Monoxide shirt, Particle Pollution shirt and Radioactivity shirt. *PHNX* is an extravagant fashion accessory by Lauren Bowker, made using a chromic dye that is capable of reacting in the presence of carbon emissions, and that presents a reversible colour change from yellow to black. Other strategies involve inviting people to take part in a campaign about mapping the air quality across a country (e.g. *Clean Air Kit*³⁰ [Friends of the Earth, 2018] by Friends of the Earth is part of the Clean Air Campaign which aims to map the quality of air across the UK thus highlighting the many areas with high levels of pollution, with the purpose to put pressure on drivers, and make them to renounce to using diesel); and recycling air pollution and turning it into a product (e.g. *Smog Free Ring*³¹ [Studio Roosegaarde, 2017] by Dan Roosegaarde is made of carbon particles collected from Beijing's air that have been compressed for 30 minutes, and turned into a diamond cube representing a donation of 1000 meters of clean air). One last strategy identified is designing conceptual wearable pieces that people can directly engage with through touch, as seen in Stefanie Posavec's *Touching Air*³² (Posavec, 2015) collection. *Touching Air* is made of three necklaces that interpret open air quality data with the aim to communicate the physical burden of air pollution. Each necklace represents a week's worth of data from sensors measuring large particulate (PM10) levels in Sheffield. While the strategy can differ, what these projects have in common is that they focus on making the invisible issue of air pollution visible, either by offering a visual experience or by playing on people's fears about the dangers of air pollution. Second, it was found that none of these projects use bio-inspiration as a strategy to raise awareness.

In regard to the third criterion, the focus was on looking into the materials and processes each project used as a way to find if design for raising awareness is limited to one medium, if textiles are used as a medium in any of these projects, and if they are, how are they used. One finding was that there is an emphasis on the use of high technology as a primary tool in the making of these projects. While three public installations (e.g. *Acid Rain*, *Delhi Lung*, *Totemy Towers*) are made of local materials using low-tech processes, the majority of the projects make use of high technology. These include projects already discussed (e.g. *Particle Falls*, *PHNX*, *Smoke Cloud*, *Catalytic Poetry*, *Velo2*, *Aerochromics*, *Esmog Data*, *Clean Air Kit*, *Pollution Pods*, *Air Pollution Toile*, *Light Creature*, *Smog Shades*), as well as a few other projects that have not been introduced yet and that include: the

²⁸ *Aerochromics*. Available from: <<http://aerochromics.com/>>.

²⁹ *PHNX*. Available from: <<http://seetheunseen.co.uk/phnx/>>.

³⁰ Clean Air Kit. Available from: <<https://friendsoftheearth.uk/clean-air/clean-air-campaign-order-clean-air-kit>>.

³¹ Smog Free Ring. Available from: <<https://www.studioroosegaarde.net/project/smog-free-ring>>.

³² *Touching Air*. Available from: <<http://www.stefanieposavec.com/airtransformed/>>.

TZOA wearable environment tracker³³ (Woke Studios, 2017) by Woke Studios which measures air pollution and sends it to an app where data can be seen; *In the Air*³⁴ (In the Air, 2008) a project by Nerea Calvillo that consists of a digital tool that collects and codes data, that is then sent to a physical prototype, a 'diffuse façade', which serves as an indicator of Madrid air's components through a changing cloud made of water vapor and dye; *Air Ink*³⁵ (Graviky, 2017) by Graviky that utilises KAALINK technology which captures carbon emissions from vehicles or chimneys (i.e., soot), carefully detoxifies heavy metals and particle carcinogens from them, and then turns them into ink; *Humix*³⁶ (Feiger, 2017) by Montana Feiger that combines sensors, motors, and sound generators, as a way to offers an auditive experience by simulating a human sneeze when levels of pollution are higher than the safe levels as recommended by scientists and WHO. A few of them (e.g. *Light Creature*, *Smog Shades*, TZOA wearable environment tracker) also use technology in combination with mainstream modes of communication (e.g. smartphones) as a platform to reach people, due to the important role they play in our daily lives. The purpose of using smartphones is to allow changes to the environment to be tracked in real-time, thus allowing people the possibility of improving their healthy habits as they go (Newcombe, 2019). Concerning the use of textiles, first it was found that there are a limited number of projects that use textiles as a medium (e.g. *PHNX*, *Aerochromics*, *Air Pollution Toile*, and *Rain Palette*³⁷). *Rain Palette* (Sun, 2014), a project that has not been discussed previously, is a fashion collection by Dahea Sun that visualises air quality through rainwater. The textile utilises dye chemistry knowledge that has been available for a long time, but applies it in an innovative way. The fabrics are dyed with natural red cabbage dye that will change colour in reaction to the pH levels of rainwater, which varies on a local basis and is a good indicator of the quality of air. Second, it was found that out of these four projects only one is a domestic textile (e.g. *Air Pollution Toile*). Third, when looking at the materials and processes that are used to make these textiles it was found that similarly to the majority of projects discussed above, they also rely on technical innovation, in that two (e.g. *PHNX*, *Aerochromics*) use chromic dyes, which are fabric dyes capable of reacting in the presence of air pollutants and of presenting a reversible colour change; and one (e.g. *Air Pollution Toile*) uses paper treated with special chemicals that make the paper able to visualise the domestic air pollution occurring during several years. Only one project (e.g. *Rain Palette*) uses traditional textile processes (e.g. dyeing fabric with cabbage natural dye) to raise awareness about air quality.

2.3.2.1. Visual summary of the projects that raise awareness about air quality

Figure 2:3 summarises the design projects discussed in this analysis in regard to the three criteria established earlier.

³³ TZOA wearable environment tracker. Available from: <<https://www.tzoa.com>>.

³⁴ *In the Air*. Available from: <<http://www.intheair.es/>>.

³⁵ *Air Ink*. Available from: <<http://www.graviky.com/air-inktrade.html>>.

³⁶ *Humix*. Available from: <<https://www.montanamae.com/humix/>>.

³⁷ *Rain Palette*. Available from: <<https://www.sundahea.com/rain-palette>>.

[illegible]

Figure 2:3 Analysis of contemporary practice that raises awareness about air quality

this map is included as a foldout in the printed version of this thesis

2.3.3. Key findings from the review of contemporary practice

The key readings drawn from this review are as follows:

- Raising awareness about air quality through design projects can make the issue accessible to a large number of people.
- There is a lack of practice that raises awareness about air quality at home.
- There is a gap in utilising bio-inspiration as a strategy for design that raises awareness.
- The majority of projects raise awareness by making an invisible issue visible, thus emphasizing the issue of air pollution.
- There is a gap in utilising textiles as a medium for design that raises awareness.
- The majority of projects make use of high technology, with the majority of textile projects also following this approach.
- Designers have great freedom in regard to the strategy they use to raise awareness, and the shape their projects take because there is not one single way in which this issue can be addressed, nor one single shape these projects can take.

This review evidenced an opportunity to develop designs that raise awareness about indoor air using a bio-inspired approach with practical application in textiles.

2.4. Summary of *Contextual review: air pollution at home and raising awareness*

This chapter included a literature review of air pollution at home, which identified raising awareness as an appropriate design strategy to be used in this research achieved through interactions with the textile artefacts seen as a form a quiet activism, and a review of contemporary practice on design for air quality, with a focus on designs that raise awareness about air quality.

The literature review of domestic air pollution focused on the analysis of the official reports on air pollution at home. It identified the main causes of air pollution at home, and their effects on human health, but most importantly identified what is the biggest challenge (i.e., mixed exposure) in

designing for better air quality at home, and the main recommendation (i.e., reducing exposure) official sources make when dealing with this issue. As a result, it revealed raising awareness as a pragmatic way that can work effectively in preventing the generation of air pollution at home. Following this, the discussion on quiet activism established the subtle interactions with textile artefacts as the poetic strategy for raising awareness.

The review of contemporary design practice was assisted by two exercises. The first one mapped the landscape of design on air quality to illustrate the lack of designs that raise awareness about indoor air quality, and outlined why raising awareness is the right approach for this research. The second one mapped the designs that raise awareness about air quality as a way to understand the field, evidence the opportunity to develop this kind of research, and to situate this practice.

These findings together with the findings from the third chapter (which examines the theory and practice of bio-inspiration with a focus on textiles) guided the development of the research methodology as explained in the fourth chapter.

3.Contextual review: bio-inspiration

3.1. Literature review: bio-inspiration

The literature review in this section looked to inform the definition of bio-inspiration, as well as the historical and contemporary context about bio-inspiration in order to gain a deeper understanding of the concept of bio-inspiration and further situate the practice.

The prefix 'bio' comes from the Greek word 'bios' which means life. As a result, bio-inspired design describes the discipline of design inspired by life and nature (Fermanian Business & Economic Institute, 2013; Whitesides, 2015; Polites, 2019). In addition to the theory on bio-inspiration, this literature review was underpinned by bionics, biomimetics, biomimicry and biophilic design theory as a way to establish the context in which bio-inspiration exists and to be able to define it.

3.1.1 Short history of design inspired by nature

Historically, there are many examples of designs inspired by nature, the oldest being Leonardo da Vinci's flying machine created during the late 15th century whose wings were inspired by the wings of birds. Other examples are the biomorphic sculptures of Antonio Gaudi from the late 1800s, the designs created during the Art Nouveau movement in the early 1900s, and the designs created in the 'organic design' style from the middle of the 20th century, just to name a few.

Nature has not only been used as a source of inspiration by artists and designers, but also by engineers. The technology-focused bio-inspired design gave birth in the early 1960s to 'bionics'. Coined by Jack Steele, in very simple terms bionics refers to 'deciphering "inventions of nature" and transferring them into technological innovations' (Biokon, 2019). According to Vogel (1998) bionics is the science of systems whose function is based on living systems, or which have the characteristics of living systems, while Trotto & Cianfanelli (2006, p. 114) write 'bionics, in its primary etymologic meaning, is the science that studies the electronic systems able to stimulate the behaviour of living organisms and their parts. In the design field, this meaning was extended to the science that studies the structure and the function of living organisms with the aim of acquiring inspiration to designing'. More recently, Shu et al. (2011, p. 673) define bionics as 'the application of biological function and mechanics to machine design'.

The term 'biomimetics' was first introduced by Otto Schmitt in the title of a paper published in 1969 (Iouguina et al., 2016). Biomimetics as understood by Schmitt, and as it appeared for the first time in the Merriam-Webster dictionary in 1974 is defined in very specific terms as 'the study of the formation, structure, or function of biologically produced substances and materials (such as enzymes or silk) and biological mechanisms and processes (such as protein synthesis or photosynthesis), especially for the purpose of synthesizing similar products by artificial mechanisms which mimic natural ones' (Harkness, 2002, p. 481). Some current definitions of biomimetics, however, are generic and imprecise, for example, 'synonymous with "biomimesis", "biomimicry", "bionics", "biognosis", "biologically inspired design", and similar words and phrases' (Vincent et al., 2006, p. 471), 'adaptation or derivation from nature' (Bhushan, 2009), or 'the subject of copying, imitating, and learning from biology' (NASA, 2019). Lepora, Verschure & Prescott (2013, p. 2) on another hand provide further insight into biomimetics when they define it as 'the development of

novel technologies through the distillation of principles from the study of biological systems’.

Even though bionics, biomimetics, biomimicry, and bio-inspiration are considered synonyms, and defined as ‘copying or adaptation or derivation from biology’ (Vincent et al., 2006, p. 471), and as ‘emulating natural models, systems, and processes to solve human problems’ (Shu et al., 2011, p. 673), in this research, bionics and biomimetics are synonymous with each other but are not synonyms with biomimicry, nor bio-inspiration. As it will be explained later, this is because neither bionics nor biomimetics deliver sustainable solutions (as ecological considerations in regard to product lifecycle or the impact it may have on the environment have to be integrated into product development) and therefore do not have as goal the preservation of nature which is one of the primary aims of biomimicry as defined by Benyus (2002), and because bionics and biomimetics have a technical application focus, which bio-inspiration (in the way it is used in this research) does not have.

3.1.1.1. Biomimicry

The term ‘biomimicry’ was coined and popularized by Janine Benyus in her seminal book *Biomimicry: innovation inspired by nature* published in 1997. Etymologically, it has its origin in the Greek words ‘bios’ meaning life and ‘mimesis’ meaning imitation. Biomimicry refers to ‘the conscious emulation of nature’s genius’ (Benyus cited in Pawlyn, 2016, p. 2), and proposes looking at nature as a source of innovative solutions to solve human problems. Concordant with the idea that ‘The significant problems we face cannot be solved by the same level of consciousness that created them’ (Einstein cited in Benyus, 2002, p. 247), biomimicry advocates for a new way of dealing with challenges. This new model of design starts by envisioning the ideal resolution and then turns to nature for ideas and inspiration (McDonough & Braungart, 2002). Thus, it marks a change in paradigm, a shift from the ‘less bad’ design approach (McDonough & Braungart, 2002) concerned with creating improved versions of the current designs or designs that fix existent problems to doing (i.e., producing) things differently in order to avoid the generation of the problem in the first place.

Benyus advocates for the mimicking of nature as a way to find sustainable solutions to human challenges, because nature has 3.8 billion-years-old strategies (models) that have been perfected to efficiently solve problems, and thus can offer insight into how to craft a more sustainable future. To achieve this, the philosophy of biomimicry promotes the use of nature not only as a model but also as a measure and a mentor. In the introduction to her book *Biomimicry: innovation inspired by nature* Benyus (2002) writes:

‘Nature as model. Biomimicry is a new science that studies nature’s models and then imitates or takes inspiration from these designs and processes to solve human problems, e.g. a solar cell inspired by a leaf.

Nature as measure. Biomimicry uses an ecological standard to judge ‘the rightness’ of our innovations. After 3.8 billion years of evolution, nature has learned: What works. What is appropriate. What lasts.

Nature as mentor. Biomimicry is a new way of viewing and valuing nature. It introduces an era based not on what we can extract from natural world, but on what we can learn from it’.

These guidelines provide designers with a tool to evaluate their ideas while staying focused on ecological gains. The innovation of their ideas is not the only important aspect of the design, how the design fits in the context in which it is placed is just as important.

3.1.1.2. Bio-inspiration

Just like biomimetics, ‘bio-inspiration’ or ‘bio-inspired design’ also tends to be defined broadly, as synonymous with biomimesis, biomimicry, biognosis, biomimetic design, bioanalogous design, and biologically inspired design (Shu et al., 2011), as including everything ‘from superficial mimicking of form all the way through a scientific understanding of function’ (Pawlyn, 2016, p. 2), or as ‘the generic term that encompasses all the different approaches of design which is inspired by life, nature and living organisms (Montana-Hoyos & Fiorentino, 2016, p.3). Whitesides (2015, p. 1) however, offers further clarification defining bio-inspiration as a strategy for ‘using phenomena in biology to stimulate research in non-biological science and technology’, while in the report by the Fermanian Business & Economic Institute (2013, p. 8) bio-inspiration is defined in contrast to biomimicry as ‘not just the literal imitating or mimicking of the natural world but rather building and expanding upon an idea inspired by nature’, which implies a more open approach to the interpretation of natural phenomena. This research is built on this latter understanding of bio-inspiration.

When researching the term ‘bio-inspiration’ the literature seems to focus on bio-inspiration as a process, and as a result, the existing articles discuss the process of bio-inspired (or biologically-inspired) design, with topics that vary from understanding the process of biologically inspired design (Helms, Vattam & Goel, 2009), to putting forward a new method for the use of biological phenomena in concept generation (Shu et al., 2011; Cheong & Shu, 2013), to the analysis of the most important tool, Ask Nature (2013), with the goal to improve it so that practitioners can identify more out of the box solutions (Vandevenne, Pieters & Duflou, 2016). Whitesides (2015) also focuses on bio-inspiration as a process; a process through which one can use and apply information from nature, a process that is based on three steps: (1) observation of living organisms’ functions (i.e., behaviours), (2) abstractions of those functions, and (3) imitation of those functions. These three steps are utilised when working with bio-inspiration in this research. However, it will be discussed further in this chapter what the entire bio-inspiration process (as is applied in this research) consists of.

3.1.1.3. Biophilic design

Biophilic design builds upon the philosophy of biophilia (coming from ‘bios’, in Greek, and the Latin word ‘philia’ meaning love) popularized by biologist Edward O. Wilson in his book *Biophilia* from 1984. In this book, Wilson (1984) describes how behaviours, such as gardening or hiking, are signs of a genetic affiliation which demonstrate a strong connection with our living planet. Wilson referred

to biophilia as ‘the inherent human inclination to affiliate with natural systems and processes, especially life and life-like features of the non-human environment’ (1984 in Kellert et al., 2008, p. 3). When discussing it, Kellert (in Kellert & Wilson, 1993, p. 42) argues that biophilia ‘powerfully asserts that much of the human search for a coherent and fulfilling existence is intimately dependent upon our relationship to nature’. Later on Kellert (1997, p. 4) also writes ‘the notion of biophilia emphasizes that healthy and diverse natural systems represent less a luxury than the potential for helping us realize lives of satisfaction and meaning’.

Discussing the effects that exposure to nature can have on human wellbeing, Ulrich (in Kellert and Wilson, 1993, p. 106) states that ‘exposure to unthreatening natural scenes can promote recovery from mild and even acute stress’ and ‘recovery from mental fatigue stemming from work situations involving prolonged, directed, effortful attention’ (p. 110), ‘exposure to such environments (natural settings) may facilitate creative problem solving or high-order cognitive functioning via their ability to alter one’s emotional state’ (p. 112); and ‘unthreatening natural environment are effective in eliciting broadly positive shifts in emotional states among unstressed as well as stressed individuals’ (Ulrich 1979, 1981; Hartig, Mang, & Evans 1991 in Kellert & Wilson, 1993, p. 113). Here, wellbeing (also known as subjective wellbeing as it is used in psychology and economics) refers to ‘people’s mood and emotions that result from being exposed to events or stimuli of different nature (Diener, 2000 in Hidalgo, 2014, p. 536). OECD (Organisation for Economic Co-operation and Development) (2013 in Hidalgo, 2014) defines subjective wellbeing as ‘good mental states that include positive and negative self-evaluations reported by people about their lives and the affective reactions to their experiences’. Hidalgo (2014, p. 536) argues that ‘from a psychological perspective, a person can be restored from stress by being exposed to nature’, and it is not only through direct relation to nature but also virtual relation to nature and other features such as water, music, and colourful surfaces.

Building upon the philosophy of biophilia, Kellert (2005) has been promoting the notion of biophilic design in relation to the built environment. Biophilic design is seen as an approach to architecture that seeks to connect building occupants more closely to nature, due to the positive effects this can have on human health. For this reason, it is described as an ‘innovative approach that emphasizes the necessity of maintaining, enhancing and restoring the beneficial experience of nature in the built environment’ (Kellert et al., 2008, p. VII) that is ‘essential for providing people opportunities to live and work in healthy places and spaces with less stress and greater overall health and wellbeing’ (Terrapin Bright Green, 2014, p. 14). This approach is based on scientific evidence that shows that contact with nature can reduce stress, improve cognitive function and creativity, as well as overall wellbeing (Terrapin Bright Green, 2014). In this sense, Pedersen (2009, p. 8) writes ‘people feel less stressed, are able to concentrate better and are even able to physically and psychologically heal more rapidly, when they have a connection with the living world’. When analysing the potential that environments have to evoke positive moods, Gillis & Gatersleben (2015) conclude that built environments that have the features of biophilic design could be made restorative³⁸ by incorporating natural elements in their design. Gillis & Gatersleben (2015) also discuss the use of images of nature in the built environment, and argue that these images have been found to be ‘as stress reducing as

³⁸ Restorative environments are ‘environments that evoke positive moods, have properties that draw people’s attention without being stressful or demanding, can help people recover more quickly and fully from mental fatigue and stress’ (Gillis & Gatersleben, 2015, p. 949).

actual views of nature in certain circumstances' (p. 954), and at times 'images of nature can even be more restorative than the view of real nature, depending on the content of the image and the view of nature' (p. 954). Gillis & Gatersleben (2015) also discuss the use of natural materials, but only found information about the potential that wood has when used as part of a biophilic design. Last, research has been undertaken on the potential engaging not only the visual sense, but also the auditory sense and olfactory sense has in generating a sense of wellbeing. In this respect, Qin et al (2014, in Gillis & Gatersleben, 2015) stated that the type of plants that were most highly rated as restorative were those that were slightly fragrant. The shortcoming of the research on biophilic design is that while research has been undertaken on the individual elements of biophilic design (e.g. plants, images of nature, and natural light) the combination of elements has been little researched.

The biophilic design approach proposes creating environments that resemble natural environments by introducing bio-inspired designs or by bringing natural elements back into the built environment. According to Kellert (2005), biophilic design has two dimensions: organic design and vernacular design. Organic design involves incorporating in the design of the buildings things like natural lighting and ventilation, shapes and forms that directly, indirectly or symbolically remind people of natural elements, while vernacular design refers to buildings that 'foster an attachment to the place by connecting culture, history and ecology within a geographic context' (Kellert, 2005, p. 5) and has in mind 'the tailoring of the built environment to the particular physical and cultural places where people live and work' (Kellert, 2005, p. 165).

When discussing the effects of meditation in an outdoor natural setting, Diernis et al. (2019, p. 2) discovered that 'natural environments are particularly well suited, as they inherently possess patterns that are succinctly extended, rich, and coherent to engage the mind, which is believed to enable fascination in an "undramatic fashion"'. What is attempted through the bio-inspired artefacts created though this research is also an experiencing of nature, this time in the indoor environment. This can in turn generate an experience similar to the one taking place in the outdoor setting, one that is meditative and that allows the mediator to distance physically or mentally from everyday life, and thus 'become softly fascinated as he or she effortlessly observes the stream of sensations, feelings, and thoughts' (Diernis et al., 2019, p. 3).

3.1.2. Bio-inspiration and biomimicry in this research

The conceptual relation that was initially established between bio-inspiration and biomimicry takes into consideration bionics/ biomimetics and draws on the model Benyus (2002) put forward that promotes the mimicking of nature as a model, as a measure and as a mentor. This conceptual relation is illustrated in Figure 3:1.

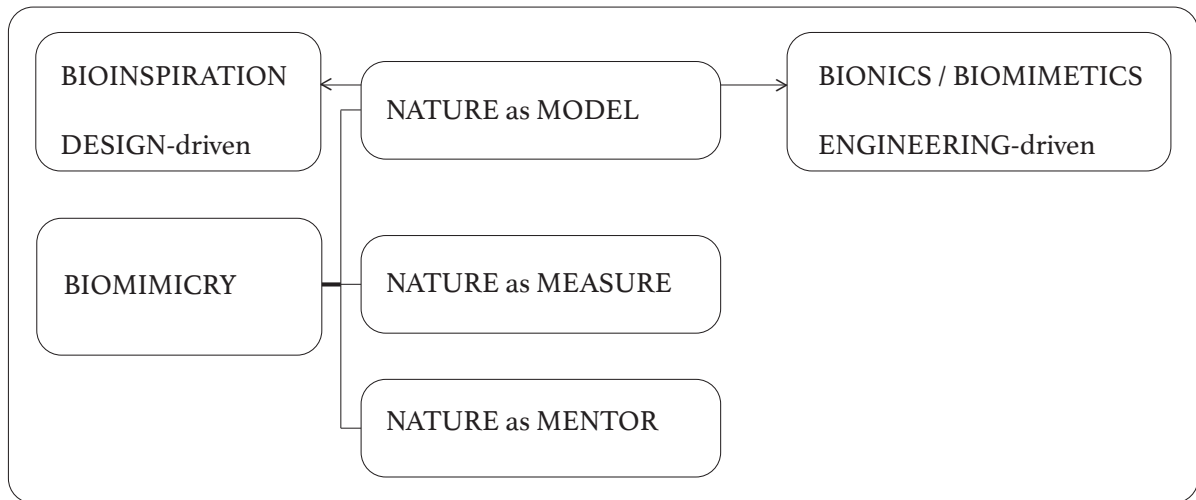


Figure 3:1 The conceptual relation between bio-inspiration, biomimicry and bionics/ biomimetics (after Benuys, 2002)

According to Figure 3:1, there is a difference between bio-inspiration (as it is understood in this research) and bionics/ biomimetics, and this difference lies in that while in the case of bio-inspiration nature is used as a model in the context of creative industries (design-driven innovation), in the case of bionics/ biomimetics nature informs engineering-driven innovation. When working with biomimicry, however, the approach can be design-driven or engineering-driven. The second point reflected in Figure 3:1 is that bio-inspiration, biomimicry, bionics, and biomimetics promote the use of nature as a model. The third point is that when working with biomimicry nature is also used as a measure and as a mentor. That is because the goal of biomimicry is not only to copy nature but in copying to create designs that are conducive to life (i.e., sustainable) since ‘ultimately the deep practice of biomimicry is not about learning, modeling and emulating nature’s designs but about viewing and valuing healthy natural systems for their intrinsic worth, not just for what we gain from them’ (HOK, 2013, p.5). As a way to ensure that the designs created are sustainable, the process of biomimicry also involves evaluating the design against life’s principles formulated by the Biomimicry Institute: adapt to changing conditions, be locally attuned and responsive, use life-friendly chemistry, be resource-efficient, integrate development with growth, evolve to survive (Ask Nature, 2017). Because this research is not primarily motivated by sustainability, but the goal is to design for raising awareness, working with bio-inspiration does not imply evaluating the designs against life’s principles. The approach developed does have in mind the creation of artefacts that do not contribute in any way to the generation of air pollution in the home environments in which the artefacts are meant to be placed. The choice of materials and processes is thus influenced by this, and efforts are made to reduce as possible the negative effects the materials and processes used might have on the environment. Furthermore, the research follows the concept of ‘well-adapted’ design (as opposed to maladapted) as put forward by Benuys (in Ternaux, 2012) which refers to creating products that are not harmful and integrate themselves into the habitat as life-enhancing.

Both, Benuys’s definition of biomimicry as the need to learn from nature, to copy its models and use them to create designs that improve our world (Biomimicry Institute, 2019) as well as the definitions identified upon reviewing the literature on bio-inspiration, promote the use of nature as model. However, while *biomimicry* implies a mimicking of the natural phenomena, that is an exact

translation of the mechanisms by which a function is achieved with the purpose to create a design that performs the same function the biological model that was mimicked performed; *bioinspiration* allows for a broader interpretation of life, it means building and expanding upon an idea inspired by nature, which implies a more open approach to the interpretation of biological phenomena. *To mimic* means to imitate, to copy as it is, to create as close a rendering to the model as possible, while *to be inspired* means to be creative in the way you interpret nature. Based on these observations, in this research bio-inspiration is understood as *looking at nature in order to find inspiration for solutions to challenges, where inspiration implies replicating the way nature does things but also being creative in one's interpretation of nature, not translating things as they are, but coming up with new interpretations of nature.*

3.1.3. Bio-inspiration and biophilic design in this research

Through this research the notions of functional inspiration and symbolic inspiration are put forward. That is, the textile artefacts developed in this research take inspiration from the biological model at two levels: the function level and the symbolic level. Functional inspiration means inspiration is taken from the function the model performs, that is the artefacts replicate the mechanism by which a model achieve its function, while symbolic inspiration refers to taking inspiration from the aesthetic of the natural model as reflected in the imagery utilised and the materials used.

In this research, the use of nature-inspired imagery and natural materials in the design of artefacts has as main goal the triggering of thought about the inspiration behind the artefacts. This is in line with what Kellert & Wilson (1993) wrote about when introducing one (i.e., symbolic) of the nine fundamental aspects of the human species basis for valuing and affiliating with the natural world. This aspect makes references to the symbolic experience of nature and suggests that the human use of nature can be used as 'means of facilitating communication and thought' (p. 51).

3.1.4. The landscape of 'bio' related design field

In addition to the five concepts discussed previously, there are other concepts that together are building the landscape of 'bio' related design field: biodesign, bio-integrated design, and bio-utilisation. At the time it was introduced, biodesign (Myers, 2012) promoted a shift from using nature as inspiration to making nature the material of design. Recently, the term 'bio-integrated design' has emerged, as the name of an interdisciplinary science-oriented programme taught jointly by the Bartlett School of Architecture and the Biochemical Engineering Department of University College London in the UK. The approach they promote is similar to the approach promoted by Myers (2012) and involves going beyond mimicking of nature to using nature as a medium for design. According to the school's page (UCL, 2020), 'nature plays a central role in the programme, beyond that of a model or inspiration, it is the medium of a new multi-layered design approach that is biologically, materially and socially integrated'. In the field of design, bio-utilisation emphasizes the 'direct use of nature for beneficial purposes' (Pawlyn, 2016, p. 3). Benyus also writes about bio-utilisation as one of the three kinds of 'bio' in addition to biomimicry and 'bio-assisted technologies', and summarises the three as follows 'bio-utilisation is the process of harvesting the product, bio-

assisted or domestication is the process of breeding the producer, and biomimicking is the process of becoming the producer’ (Benuys cited in Ternaux, 2012, p. 40). Just like for Pawlyn, for Benuys bio-utilisation also implies using natural materials (products from the natural world) in the making of products, buildings and so on.

Figure 3:2 is a map of these concepts. While biomimicry, bionics/biomimetics, and bio-inspiration are seen as generating designs that *work like* nature, that mimic nature; biodesign and bio-integrated design are seen as designs that *work with* nature, that is, with the help of biotechnology³⁹ they fabricate with nature, and domesticate nature; and biophilic design is seen as design that *looks like* nature, and *integrates* nature. Where nature refers to all living organisms that can include plants, animals, and micro-organisms. According to Figure 3:2, there is an overlap between design that works with nature and design that works (behaves) like nature, and that is because sometimes the goal of biodesign is to mimic nature, using nature itself as a material for design.

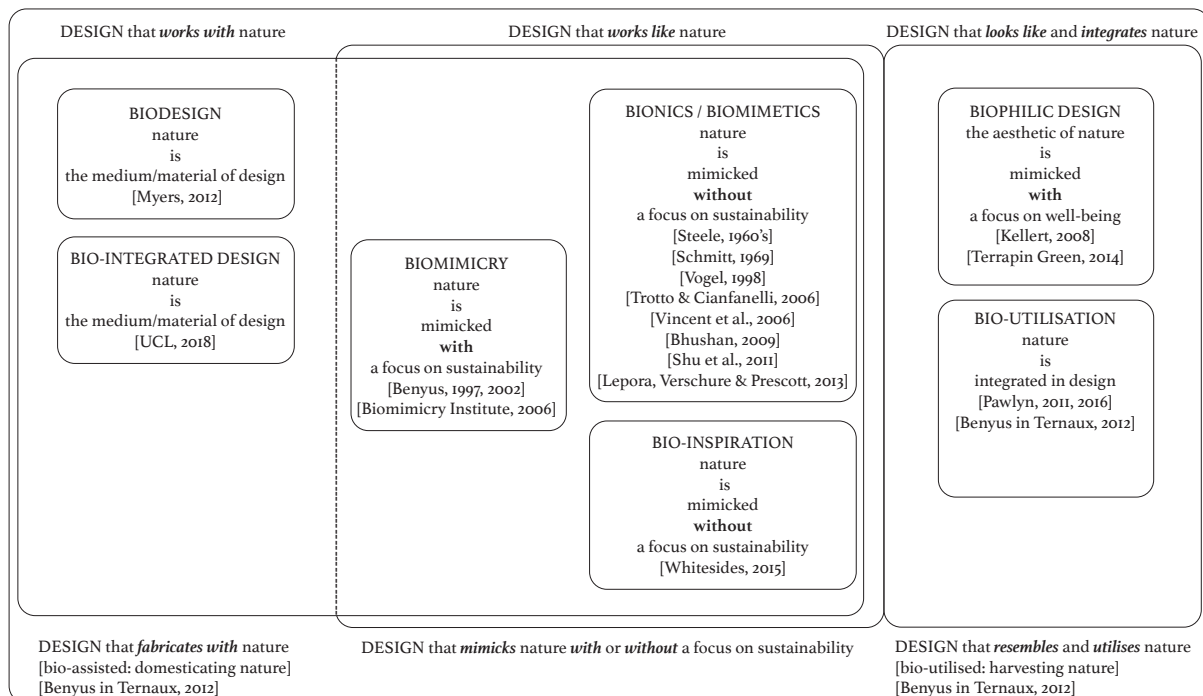


Figure 3:2 Map of concepts in the landscape of ‘bio’ related design field

3.2. Review of contemporary practice: bio-inspired design

The review of contemporary practice with a focus on textiles was done to demonstrate how the thesis contributes with a new approach for bio-inspired textile design, and to illustrate the gap in practice. The review was supported by two mapping exercises and was based on the review of existing literature and of a sample of works, physical examples of what the literature catalogues as biomimetic or bio-inspired designs developed in professional settings including academia and industry. The examples discussed have been found:

³⁹ Biotechnology is ‘the use of life (bios, in Greek) to develop products or processes, which perform tasks for humankind’ (Montana-Hoyos & Fiorentino, 2016, p. 2).

- through a search of the world-wide-web using keywords, for example, , ‘biomimicry in textiles’, ‘biomimicry in design’, ‘biomimetic textiles’, ‘biomimetic design’; bio-inspired textiles’, ‘bio-inspired design’, ‘bio-inspiration in textiles’, ‘bio-inspiration in design’;
- through viewing of exhibitions on biomimicry/bio-inspiration and reviewing of exhibition catalogues;
- through reviewing of journals and books on biomimicry/ bio-inspiration.

3.2.1. Analysis of bio-inspired design practice with a focus on textiles

The bio-inspired practice with a focus on textiles (these include fibres, fabrics, and products) was analysed in order to identify what is the reason for working with bio-inspiration, and what are the key features of bio-inspired textiles as a way to understand the landscape the research is positioned in.

The oldest example of bio-inspired textile is the attempts of Chinese to make artificial silk about 3000 years ago (Vincent et al., 2006). However, it is the year 1948 when *Velcro* (Eadie & Ghosh, 2011), the fastening system that replicates the hook and loop system that the burdock burrs have, was invented that marks the official beginning of the bio-inspired practice in textiles. Since then, bio-inspired ideas for textiles were mostly focused on physical materiality, that is the enhancement of engineered fibres, surfaces, and finishes. In this context, it made sense that the development of these textiles which required technical, physical, or molecular engineering and for which performance requirements were primordial, were undertaken by technical institutions. Within the textiles industry, material scientists have been looking at nature as a source of inspiration for the design of high-performance fabrics that are inspired by the characteristics of natural organisms (Eadie & Ghosh, 2011). Among these are: *Aquapel* (discussed previously); *Stomatex*⁴⁰ (Stomatex, 2004) invented by Nigel Middleton and inspired by the physics of transpiring plant leaves; *Morphotex* (Kapsali, 2016) manufactured by Teijin in Japan, that requires no dyes or pigments, since it uses structural colour to mimic the microscopic structure of the Morpho butterfly’s wings, which appear a shimmery cobalt despite its lack of pigment; *Polymer Opal*⁴¹ (University of Cambridge Research, 2013) developed by researchers at Cambridge University, also a structurally coloured fabric inspired by the structural colours found in nature in butterfly wings, peacock feathers and opals; *LZR Pulse used for the FastSkin* (Kapsali, 2016) a fabric that is inspired by shark skin (*Squaliforms*), thus it reduces friction and turbulence, and it also emulates shark skin’s hydrophobic texture, allowing swimmers to glide through water seamlessly; and fibres, like *Kevlar* (Pawlyn, 2016) an industrially produced material that replicates spider silk and represents the strongest synthetic fibre humans have been able to manufacture to date. These bio-inspired textiles aim at replicating solutions that plants, insects, and animals in nature have evolved over many years and developed into efficient solutions (e.g. self-cleaning, hydrophobicity, self-repairing, drag reduction). More recently, textile designers have started using natural models as inspiration for developing new

⁴⁰ *Stomatex*. Available from: <<http://www.stomatex.com/neoprene-fabrics-material-supplier.html>>.

⁴¹ *Polymer Opal*. Available from: <<https://www.cam.ac.uk/research/news/flexible-opals>>.

textiles. However, to date, bio-inspiration in textile design has been applied to a fairly limited extent. Most often designers have looked at pinecones as inspiration for their textiles. Due to their responsive behaviour⁴² which allows them to close and open as a response to changes in temperature and humidity (Ternaux, 2012), pinecones are used as a model for the design of various textiles. One example are the smart textiles created as a result of Veronika Kapsali's doctoral research, *Metropolitan Comfort* (Quinn, 2013), centred on the development of an adaptive textile that helps managing physiological discomfort during urban travel, and inspired by the way moisture can induce shape changes in pinecones. Another example are the responsive textiles for knitted architecture developed by Jane Scott (2012). Made of 100% natural materials these textiles respond to changes in humidity and have knitting structures that are manipulated to also move once the humidity levels change. A last example includes *Techno Naturology*⁴³ (Alive, 2013) by Elaine Yan Ling, an interactive textile part of a collection of smart architectural surfaces that mimics the behaviour of the pinecone in that it is able to close and open as a response to changes in temperature and humidity. Apart from looking at pinecones, designers created textiles inspired by the way the forest floor is created, thus mimicking the arrangements of leaves on a forest floor. Named *Entropy*⁴⁴ (Interface, 2019) and created by Interface, these carpets are made of tiles that even though vary from one another, they come together beautifully, and when stained or torn can be individually replaced. Designers also created textile inspired by the cradle-to-cradle approach (McDonough & Braungart, 2002) that exists in nature. This is a concept introduced by William McDonough and Michael Braungart, and it represents a biomimicry approach to design by considering the product's life cycle thus minimising its environmental impact. *Climatex Lifecycle* fabrics⁴⁵ (Material District, 2007) by Rohner are representative in this sense, as they are inspired by the natural cycle and are made from natural materials and processed entirely with non-toxic chemicals. These fabrics are so safe, that the trimmings from the mill become mulch for local gardens, returning the material's biological nutrients to the soil. A visual summary of the above-mentioned textiles can be seen in Figure 3:3 below.



Figure 3:3 A collection of bio-inspired textiles

⁴² Pinecones' responsive behaviour means they are able to close and open as a response to changes in temperature and humidity (Ternaux, 2012).

⁴³ *Techno Naturology*. Available from: <<http://thisisalive.com/techno-naturology/>>.

⁴⁴ *Entropy* carpet. Available from: <<https://www.interface.com/CA/en-CA/detail/entropy-metamorphosis-1178005999G15S001>>.

⁴⁵ *Climatex Lifecycle* fabrics. Available from: <<https://materialdistrict.com/material/climatex-lifecycle/>>.

Through this analysis, it was found that all these textiles have been created with a practical function in mind. They were designed to perform certain functions (for example, hydrophobicity), and decisions about making (i.e., decisions related to the choice of materials and processes), were dictated by the function the textile needed to perform. In this case, the aesthetic qualities (concerning colour, pattern, texture) of these textiles emerged as a result of the materials and processes utilised. Taken outside of the context of their function these aesthetic qualities do not play a role in the interaction with the user (for example a certain knit structure generates a certain fabric texture, and it is because of that texture the textile is able to perform its function, but taking the texture independently from the function the textile is performing, the engineer or designer does not account for any other roles the texture plays for the user). There are also cases, however, when decisions about the aesthetic qualities were made in the design stage of the process because these aesthetic qualities contributed to the practical function the textiles needed to perform (for example *Entropy* carpets). This approach is different than the one utilised in this research where the mechanism by which the model achieves its function it used as a source of inspiration for the design of artefacts that raise awareness, and are not aimed at reducing or counteracting the negative effects of domestic air pollution.

3.2.2. Mapping of bio-inspired design practice with a focus on design for air quality

The goal of this mapping exercise was to identify the bio-inspired works that address the issue of air pollution as to understand the current landscape of practice and illustrate the gap in knowledge, as a limited number of bio-inspired designs that tackle indoor air pollution have been identified, and none that raise awareness about domestic air pollution.

The practice of bio-inspiration spans a wide range of fields (e.g. textiles, product, vehicle and architectural design) and works on tackling a variety of issues including, but not limited to: making a fabric more sustainable by changing its lifecycle to resemble the lifecycles in nature (e.g. *Climatex Lifecycle*); making carpet tiles more sustainable by changing the way they are assembled to resemble the way the forest floor comes together (e.g. *Entropy*); making a fabric have colour through the structure of the surface just like the wings of Morpho butterfly display colour (e.g. *Morphotex*, *Polymer Opal*) and without using dyes or pigments; reducing the noise produced by high-speed trains by taking inspiration from the silent flight of owls (e.g. *Shinkansen Train*); or making architectural structures more responsive, by having them behave more like living organisms (e.g. *Radiant Soil*). In addition to these challenges, bio-inspiration also addresses the challenge of indoor air pollution. However, only one example from the field of textiles was found, *Aquapel*, a fabric that works towards tackling this issue due to its hydrophobic properties which allows it to stay clean, and thus reducing the risk of bacteria and contributing to decreasing bacterial pollution when used in the home. The other bio-inspired works identified were: *PureBond* wood adhesive, a soy-based glue that tackles air pollution by not using any formaldehyde, and *Eastgate Centre* that has no conventional air-conditioning and heating system, yet has very good ventilation. These three works (all discussed in section 2.3.1, p. 39) aim to tackle the issue of indoor air pollution by taking inspiration from models in nature and applying it to the design of products that eliminate indoor air pollution. As seen in Figure 3:4 there are no bio-inspired designs that raise awareness about indoor air pollution. However, while bio-inspiration as a strategy for raising awareness about domestic air pollution has

not been used before, bio-inspiration as a strategy for raising awareness about outdoor air pollution has been used in one project (e.g. *Humix* [discussed in section 2.3.2, p. 42]).

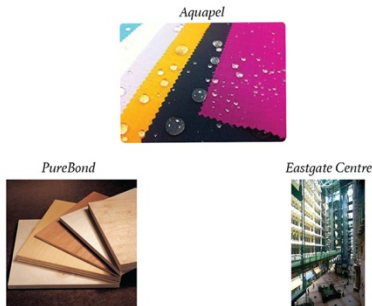


	BIO-INSPIRED DESIGNS THAT IMPROVE AIR QUALITY	BIO-INSPIRED DESIGNS THAT RAISE AWARENESS ABOUT AIR QUALITY
INDOOR AIR		
OUTDOOR AIR	<p>No Bio-inspired Designs Found</p>	

Figure 3:4 Review of bio-inspired practice for air quality

3.2.3. Approaches to working with bio-inspiration in design

The last section of the review of contemporary practice involved putting together a collection of works, with a broad enough scope, that allowed to identify the reasons for utilising bio-inspiration in design, and to illustrate how the thesis contributes with a new approach (e.g. raising awareness) for bio-inspired design. This review of practice is built on the discussion in the previous sections (the section on bio-inspired/ biomimetic textiles and the section on bio-inspired/ biomimetic design for air quality). The review is not limited to the field of textiles, instead, it takes into consideration other types of bio-inspired designs, including products, vehicles, and buildings.

Independent of being created by material scientists or designers, what the textiles discussed in the previous section have in common is that they represent practical solutions inspired by models in nature materialised through the creation of products (e.g. textiles) that enhance humans' lives. This is also the case of the designs that address air quality which represent practical applications of solutions from nature that tackle the issue of air pollution. In addition, other bio-inspired – product, vehicle, architectural – creations that exist are also designed from this perspective. These include: the *Mixer Impeller*⁴⁶ (Pax Water, 2019) by Pax Scientific Inc. whose centripetal spiral shape is

⁴⁶ *Mixer Impeller*. Available from: <<http://www.paxwater.com/biomimicry>>.

inspired by the petal-like bracts of the calla lily (*Zantedeschia aethiopica*) thus allowing it to consume less energy and to mix large quantities of fluids (4 million liters in 24 hours) more efficiently; *Biomimicry of the Sun*⁴⁷ (Cargo Collective, 2019) also known as 'Biomimetic Clock' by Dawn Haleta, a clock that mimics the physical effects of the sun, thus by using new techniques in LED technology and software, each day the LEDs illuminate and change colour temperature in sync with the chronobiological spectrum of the sun; the conceptual *Bionic Car* (Ternaux, 2012) by Mercedes Benz, a concept car whose shape is modeled after the shape of the yellow boxfish (*Ostracion cubicus*), because of its low coefficient of drag and the rigidity of its exoskeleton; the *Shinkansen* train⁴⁸ (Ask Nature, 2017) developed by engineer Eiji Nakatsu that has a shape that reduces noise, a significant problem of high speed trains, as a result, the front of the train mimics the shape of the kingfisher's beak, and, the main part of the pantographs has been added small structures that create small vortices similar to the serrations on owl's feathers; the *Talgo 350* train⁴⁹ (Railway Technology, 2019) by Talgo in association with Bombardier is inspired by the shape of the mallard duck's (*Anas platyrhynchos*) head and beak to emulate the natural streamlining benefits since the shape of the duck's beak significantly reduces its air resistance while simultaneously improving its aerodynamics; and the *Gerkin Tower* (Ternaux, 2012) or by its official name '30 St Mary Axe' designed by Foster and ARUP, that has an hexagonal skin inspired by the Venus flower basket sponge (*Euplectella aspergillum*) lattice-like exoskeleton because of its ability to disperse stresses on the organisms in various directions. This is the established solution-based approach that biomimicry is known for, which results in the development of improved versions of existing products or new products that lead to the decline, or the elimination of a problem. In addition to this approach, through this review examples where bio-inspiration is used with a speculative approach have been found. That is, inspiration from nature was used to inform the design of conceptual works that illustrate new visions of the future, by pushing the boundaries of product design, in a piece like *Pearling*⁵⁰ (De Visscher, 2019) by Emile de Visscher which is mimicking the process of producing pearls found in nature, and proposes the idea of being able to pearl any object you have at home, in order to preserve it, solidify it and transform it into an item of jewellery; and also the boundaries of architectural design, in projects like *Radiant Soil*⁵¹ (Beesley, 2013) by Philip Beasley which incorporates a variety of materials (microprocessors, shape memory alloy actuators, protocells [prototype chemical cells that behave in ways that are similar to living cells]) that react to motion, in order to suggest the idea of 'living' architecture; *The Rise*⁵² (Complex Modelling, 2013) by the researchers at CITA (Centre for Information Technology and Architecture) in Denmark that explores the concept of growing architecture in response to its environment, thus it learns from the way plants respond to their environment and mimics their way of building structural performance; and *Biornametics* (Imhof & Gruber, 2013) a research project managed by Dr. Barbara Imhof and Dr. Petra

⁴⁷ *Biomimicry of the Sun*. Available from: <<https://cargocollective.com/isawthefutureshow/BIOMIMICRY-OF-THE-SUN>>.

⁴⁸ *Shinkansen* train. Available from: <<https://asknature.org/idea/shinkansen-train/>>.

⁴⁹ *Talgo 350* train. Available from: <<https://www.railway-technology.com/projects/talgo-train-very-high-speed-spain/>>.

⁵⁰ *Pearling*. Available from: <<https://www.edevisscher.com/pearling.html>>.

⁵¹ *Radiant Soil*. Available from: <http://philipbeesleyarchitect.com/sculptures/1218_Radiant-Soil_Paris/index.php>.

⁵² *The Rise*. Available from: <<https://www.complexmodelling.dk/?p=690>>.

Gruber from the University of Applied Arts in Vienna, that explores the idea of responsive architecture inspired by biological processes, as a result the piece consists of a spatial structure, that has the potential to move, or to be moved, by stimulus from the external environment. In this latter case, the projects are seen as tools for probing and testing ideas. In addition to the two approaches identified, in this research, bio-inspiration is used with a different approach, as a strategy to raise awareness. This project does not have as end goal the development of a new product that would diminish or counteract the harmful effects of domestic air pollution, nor it speculates about the future of domestic air. Instead, it aims to use a strategy from nature as inspiration for the design of artefacts that raise awareness about air pollution at home, thus illustrating another way in which nature can be used as a source of inspiration in dealing with challenges of our contemporary life.

3.2.4. Key findings from the review of contemporary practice

The key readings drawn from this review are as follows:

- Most bio-inspired textiles are coming from the field of engineering, with a few examples from the field of design.
- When creating bio-inspired textiles the goal of both engineers and designers is the same, that is to mimic the biological model as a way to create a product that performs the same function as the model is.
- Physical function is what drives the decision about the making of the textiles, and as a result, the aesthetic qualities of these textiles are a result of these decisions.
- Most of the time bio-inspiration is used as an approach because it allows the development of improved versions of existing products or new products that lead to the decline, or the elimination of a problem by acting directly on its effects or causes. This is the established solution-based approach that biomimicry/bio-inspiration is known for.
- Rarely, bio-inspiration is used as a strategy in the development of speculative works, as a way to imagine or question the future.
- When bio-inspiration is used as an approach to tackle the problem of air pollution, bio-inspiration is geared towards informing the design of works that eliminate the causes of pollution.
- Textiles are rarely used as a medium to address the issue of domestic air pollution (only one example was identified).
- Using bio-inspiration as an approach to raise awareness about domestic air quality is a new approach.

3.3. The bio-inspired design process and the biological model

The literature review in the first part of this section looked to inform the steps of the bio-inspired design process utilised in this research. The second part of this section includes a scientific literature review in order to identify the biological model to be used as inspiration in the development of practice.

3.3.1. Literature review: bio-inspiration process

Most of the literature on the bio-inspired design process comes from the field of engineering (Helms, Vattam & Goel, 2009; Shu et al., 2011; Cheong & Shu, 2013; Vandevenne, Pieters & Duflou, 2016). In this research, the focus will be on biomimicry as ‘the process of learning from and then emulating nature’s designs, recipes and system-wide strategies’ (Benyus cited in Ternaux, 2012, p. 34), and on bio-inspiration as a process that involves ‘the abstraction and simplification of biology’ (Whitesides, 2015, p.2).

Biomimicry 3.8 (2015), a bio-inspired consultancy founded by Janine Benyuys and Dr. Dayna Baumeister, refers to biomimicry as the integration of biology in design and puts forward two approaches to this: preceding from design challenge to nature (also known as the problem-driven approach) or going from nature to design (known as the solution-driven approach). The less popular approach is the biology-to-design approach and involves studying nature first and then imagining applications for nature’s designs. The most popular approach is the design-to-nature approach, which works by identifying a design problem and turning to nature for a similar problem and solution. This is also the approach utilised in this research. The diagrams in Figure 3:5 developed by the biomimicry community for designers as a way to guide them in their creative process illustrate these two approaches, and the steps each of these approaches involve.

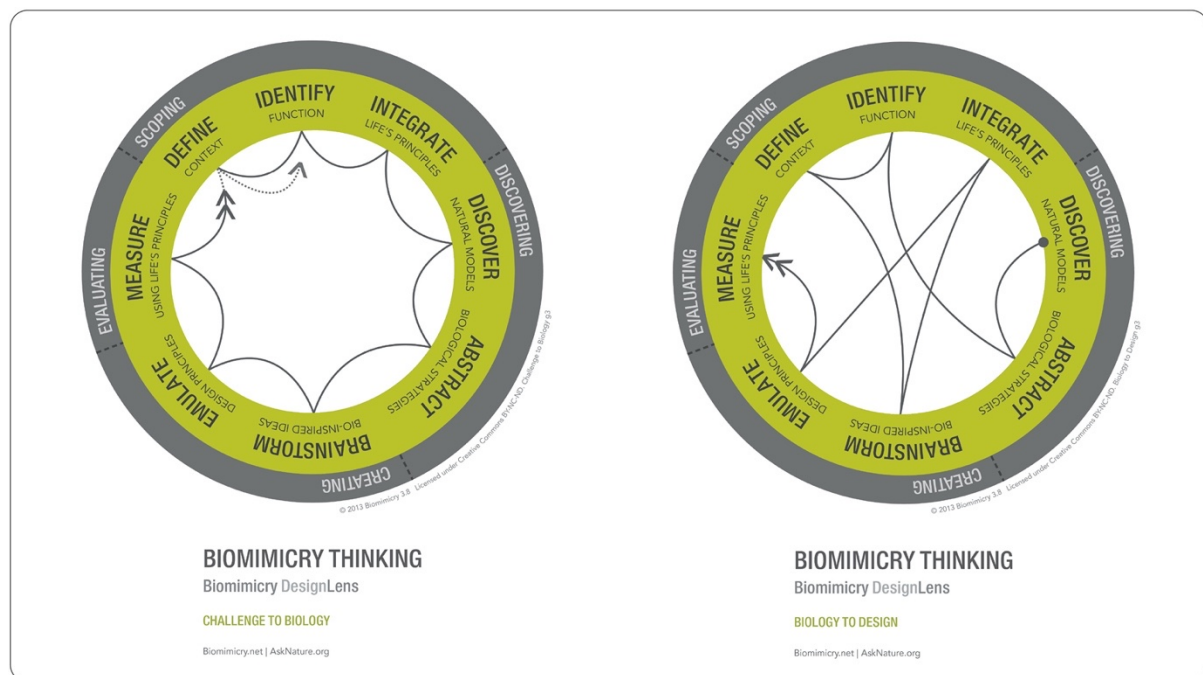


Figure 3:5 The two approaches to the biomimicry process
(Biomimicry 3.8, 2015)

Genius of a Biome report by HOK (2013) studies designs and strategies of living organisms and ecosystems that inform the design of built environments, with the goal to create an environment that is both restorative and resilient. It does so, by translating biological knowledge into design

principles, which are then illustrated through sketches, application ideas, and resolutions. The complete bio-inspired process as put forward in the report consist of the following steps:

- (1) Identifying the challenge (what is the function one wants to achieve?),
- (2) Biologising the question by asking *How does nature ...?* (Ask Nature, 2013) (this includes a survey of the scientific literature for biological models),
- (3) Finding models in nature (i.e., designs of living organisms or processes) and how those are solving the challenge,
- (4) Identifying the core biological principle that is used to accomplish the function and other secondary biological principles,
- (5) Translating the core biological principle into a core design principle and other secondary design principles,
- (6) Consulting with biologist(s) for a deeper understanding of biological principle(s),
- (7) Generating design ideas by creating sketches suggesting applications based on the design principle(s).

Even though this process includes no step which involves the evaluation of the design for its sustainable qualities, the report stresses the idea that in order to create a sustainable design, it is vital to incorporate ecological features and to consider the life's principles from the beginning of the design process.

Whitesides (2015, p. 1) defines bio-inspiration as 'using phenomena in biology to stimulate research in non-biological science and technology'. He sees bio-inspiration as a process in which observation (of biological phenomena) plays an important role, as it is the simplest, yet most effective strategy for understanding the biological phenomena, because observation does not require any expensive equipment, and can be undertaken by anyone. He also promotes the idea that to be able to imitate a function, one does not need to understand it completely, because 'even if the detailed mechanisms that make them happen are not fully understood, the marvelous phenomena that characterize biological systems can sometimes be imitated, abstracted and patched together to provide a rich set of scientific and technological puzzles, many of which are starting points for invention' (Whitesides, 2015, p. 2). This understanding of bio-inspiration broadens the range of innovation because it implies that 'when using biological systems as a source of behaviours to imitate, there is no single "correct" pathway' (Whitesides, 2015, p. 2). Whitesides's process of bio-inspiration was interpreted as comprised of the following three steps:

- (1) observation of a living organism's function (i.e., behaviour),
- (2) abstraction of a simplified version of the living organism's function – 'that is, taking inspiration from its capabilities, and mimicking some of its functionality' (Whitesides, 2015, p. 1),
- (3) imitation of the living organism's function.

3.3.2. Bio-inspiration process in this research

In this research, bio-inspiration is a process comprised of four phases (A, B, C, and D) which in total include six steps as see in Figure 3:6.

A	(1)	<i>Identifying the challenge</i>
B	(2)	<i>Biologising the challenge</i> by: a) asking How does nature ...? b) surveying the scientific literature in order to identify the model that can used as inspiration
C	(3)	<i>Formulating the design brief</i>
D	(4)	<i>Observing the model</i> and identifying the core biological principle (nature's strategy) that is used to accomplish the function
	(5)	<i>Abstracting the model</i> and formulating the design principle by describing the core biological principle without using biological terms
	(6)	<i>Imitating the model</i> by a) emulating the design principle with sketches for literal, abstracted, or conceptual applications b) generating the design artefact

Figure 3:6 The bio-inspiration process in this research

3.3.3. Biologising the challenge

The next step after *Identifying the challenge* is *Biologising the challenge*. This step involves researching the scientific literature in order to identify the model that can be used as inspiration for practice, in that it is the most appropriate to offer insight into the challenge addressed in this research.

The Biologising the challenge step usually starts by asking a series of questions, all related to 'How does nature (do what one is interested in solving)?' (Ask Nature, 2013). Here, because the approach utilised was not biomimicry, but bio-inspiration which allows for creative interpretation of the biological phenomena, the central question that Nature was asked was how does nature maintain a healthy habitat (free from harmful biological and chemical factors)? This was not because there was a search for a model that signals a problem as a way to mimic it in the design of an artefact, but because this was an important part of the design approach to raising awareness, that is for participants to be exposed (symbolically) to ways in which biological models are maintaining a healthy environment, as a way to trigger in their mind thoughts about the health of their home. In addition to the central question mentioned above, there were other questions utilised as well: how does nature keep the air healthy (free from harmful biological and chemical factors)?; how does nature protect itself from harmful biological and chemical factors? and how does nature stay healthy, as a way to get an overview of strategies that nature uses to keep healthy. These questions guided the survey of the scientific literature and for each of these inquiries, biological models and their strategies in dealing with each of these challenges were identified (Figure 3:7).

After the biological models that could be used as inspiration for practice were identified, they were mapped in relation to the strategy they are using to achieve their function (Figure 3:8). The goal of this exercise was first, to select from the previous examples identified the models that could be used as inspiration in design that addresses the challenge of domestic air pollution, and second, to outline the strategies each of these models are using, strategies that can be translated into design solutions.

As seen in Figure 3:8 these strategies were also mapped in regard to the three levels of mimicry introduced by Baumeister et al. (2013): form, process, and system, with the purpose to establish the level at which this research mimics nature.

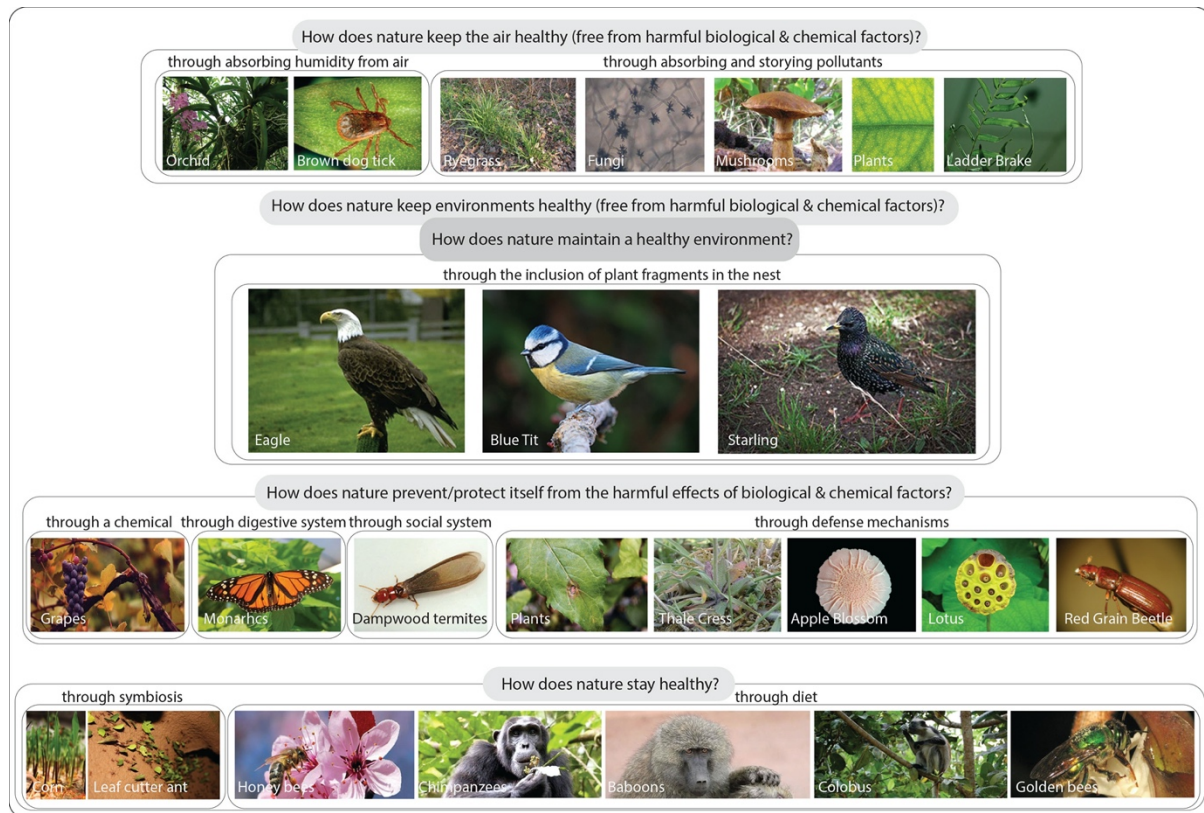


Figure 3:7 Review of scientific literature for biological models

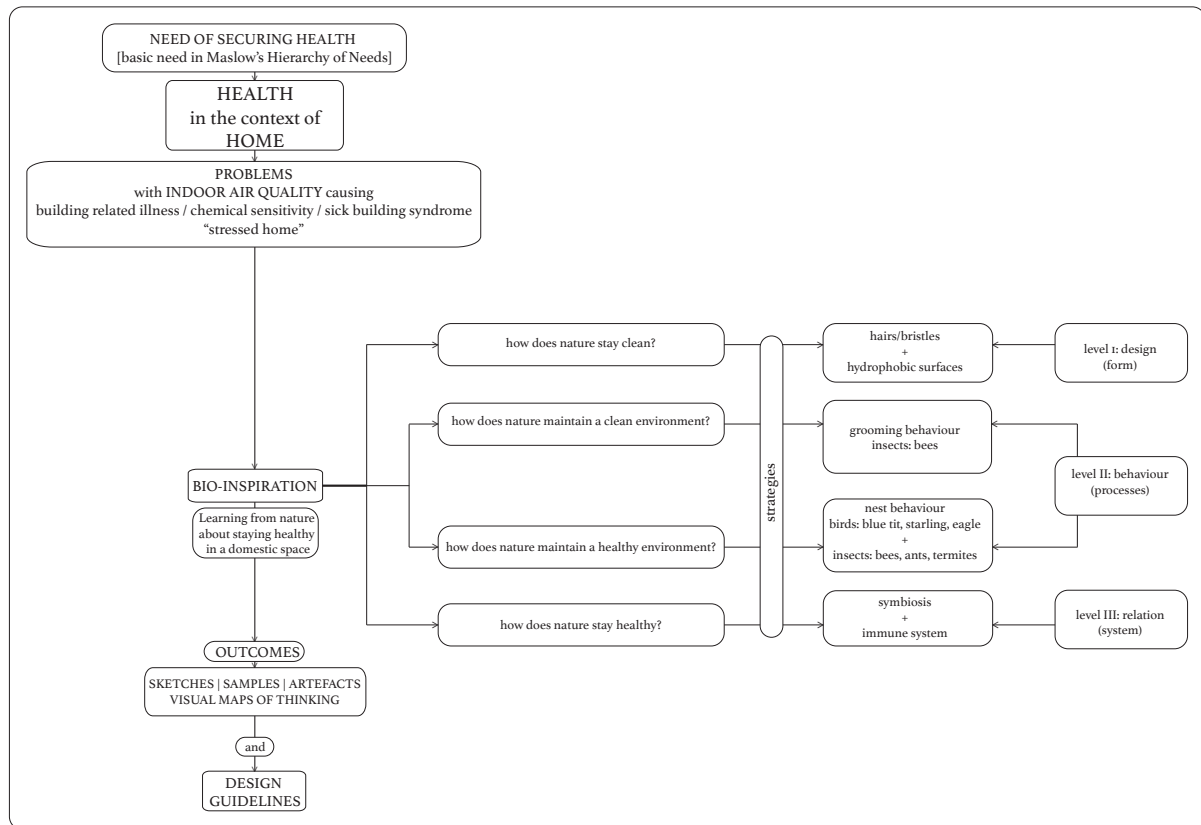


Figure 3:8 Findings of the review of scientific literature for biological models

3.3.3.1. Biological model: nest behaviour of female blue tit bird

As a result of the survey of scientific literature, the nest behaviour of female blue tit bird (*Cyanistes caeruleus*) was identified as the appropriate biological model to be used as inspiration for practice. The blue tit female bird was identified as an adequate model because, part of its behaviour is to place aromatic plants⁵³ with antimicrobial characteristics in its home (i.e., nest) in order to protect its chicks against pathogenic bacteria and parasites, therefore keeping a healthy environment (Ask Nature, 2014).

Discussing this behaviour Mennerat et al. (2009, p. 850) describe it as follows:

‘female blue tits actively incorporate fresh fragments of aromatic plants into the nest cup during the whole breeding process, i.e. from the end of nest construction until fledging. They replenish the nest with fresh fragments of the same plant species quickly after experimental removal. All females in this population add aromatic plants to their nests, but in variable amounts. In particular, females add fewer plant fragments when environmental conditions (temperature, food abundance) are less favorable, which suggests that this behaviour may be costly.’

⁵³ Aromatic plants are plant species that deliver high levels of volatile compounds easily perceptible by a human observer (Petit et al., 2002).

The use of fresh plants in birds' nests was first noted by Wimberger in 1984. Several bird species add fresh fragments of plants (that are rich in volatile secondary compounds) to their nests (Clark & Mason, 1985; Wimberger, 1984). Some (e.g. male European starling) are adding the plants while preparing their nest, while others (e.g. female blue tit) during the breeding period (Petit et al., 2002). Out of the several functional hypotheses that have been proposed to explain the behaviour of bringing fresh plant material to the nest by some species of birds, the nest protection hypothesis is considered to be the most probable functional explanation (Petit et al., 2002; Lambrechts & Dos Santos, 2000; Gwinner, 1997). The hypothesis refers to 'bringing to the nest plant fragments whose chemical compounds provide a healthier nest environment by repelling or killing parasitic organisms in the nest' (Petit et al., 2002, p. 585) or by 'masking the chemical cues that ectoparasites⁵⁴ use to find hosts' (Lambrechts & Dos Santos, 2000, p. 175). Most recently, Mennerat et al. (2009) argue that fresh plants brought to the nests by adult blue tit female birds, while not directly effective against nest ectoparasites, could protect chicks from infection by pathogenic microorganisms by limiting bacterial richness and density on their chicks.

Plants used by blue tits in the nest

According to Lambrechts & Dos Santos (2000), the blue tits build their nests in cavities and use predominantly moss, as well as grass and small twigs to form the foundation of the nest. To the nests with eggs and chicks, blue tits also bring other fresh herbaceous leaves. Blue tits are very specific about the plants they are bringing into their nests, as the plant fragments found in blue tits nests represent only a very small proportion of the plant species found in the habitats of blue tits (Petit et al., 2002; Gwinner, 1997). Petit et al. (2002, p. 587) remarked that 'Of over 200 identified species available on the study plots, only 6-10 species were brought to the nest'. And according to Lambrechts & Dos Santos (2000) some nests contained aromatic herbs not present on the territory. Most of the aromatic plant species collected by the blue tits contain identified chemical substances known for their antibacterial, antiviral, fungicidal, insecticidal and/or insect repellent properties (Petit et al., 2002). The plants that the blue tit places in its nest are: lavender (*Lavandula stoechas*), apple mint (*Mentha suaveolens*), daisy (*Helichrysum italicum*) and yarrow (*Achillea ligustica*). These are also medicinal plants known for their use in human house cleaning or self-medication. However, Mennerat et al. (2009) argue that even though many of the plant species used by blue tits are known to have in vitro antibacterial properties (e.g. inhibition of bacterial growth), their efficiency in natural ecosystems such as bird nests is untested.

3.4. Summary of Contextual review: bio-inspiration

This chapter included a literature review about bio-inspiration and related concepts, followed by a review of the biomimetic/ bio-inspired practice, and a review of the bio-inspiration process followed by a survey of the scientific literature.

By reviewing the literature about bio-inspiration and the related concepts a distinction between bionics and biomimetics (seen as synonyms) and biomimicry and bio-inspiration was made followed by a distinction between biomimicry and bio-inspiration, which lead to the introduction of a new

⁵⁴ An ectoparasite is a parasite that lives on the exterior of its host (Merriam-Webster, 2016).

definition of bio-inspiration as using nature as model to address contemporary challenges, where inspiration from nature is applied in a design-driven creative process. In addition, through the literature review the relation between bio-inspiration and biophilic design was articulated as well as the two levels at which inspiration from nature is taken. Last, through this review bio-inspiration was situated in the field of design that focuses on taking inspiration from nature, and that together with biodesign, and bio-integrated design (which focus on using nature as a material for design), and biophilic design (which focuses on resembling nature) and bio-utilisation are forming the landscape of the 'bio' related design field. The review of contemporary biomimetic/ bio-inspired practice highlighted the predominant engineering-based approach to bio-inspiration when applied to the creation of textiles. It also identified the limited number of biomimetic/ bio-inspired designs that deal with the issue of air pollution, and the even more limited number of biomimetic/ bio-inspired textile designs (only one example was identified). Last, it revealed that when working with inspiration from nature, most designers use it towards the development of improved versions of existing products or new products that lead to the decline, or the elimination of the problem by acting directly on its effects or causes; and, a few use it to speculate about the future. In contrast to these approaches, through this research, a new approach to working with bio-inspiration was put forward, as bio-inspiration is used as a strategy to raise awareness. The literature review of the bio-inspiration process discussed various biomimicry and bio-inspiration processes and articulated the steps of the bio-inspired process as used in this research. This chapter continued with the search for the biological model that will be used as inspiration for the development of practice and ended with identifying the nest behaviour of female blue tit bird as the appropriate biological model to be used as inspiration for the practice.

The findings in this chapter together with the findings from the previous chapter (which included a literature review and a practice review of design for air quality) informed the development of the research methodology as explained in the next chapter.

4. Methodology

4.1. Research stages with multiple methods

The contextual reviews in the previous chapters represented the framework for practice and guided the development of a methodology that addresses raising awareness about air quality through a bio-inspired textile practice.

This research brings together multiple methods from design and social sciences. Gray & Malins (2004) describe the use of multiple methods and sources to validate evidence and examine a research question from various perspectives as triangulation. They also argue that this helps to eliminate possible bias that can arise from using only one method, since ‘the more information we have from varying perspectives, the more able we are to test our ideas and eliminate bias that might arise from each method’ (Gray & Malins, 2004, p. 121). Here, these methods are ‘never simply used, but rather appropriated’, ‘the designer has the responsibility of assessing the nature and role of a method, its possible outcomes, and underlying values, and then to add it to her toolbox and apply it skillfully in relevant situations’ (Lowgren & Stolterman, 2007, p. 64).

The research enquiry was structured around two stages as reflected in this thesis. Research stage 1 involved the development and evaluation of textile artefacts that raise awareness about air quality. This stage had as purpose the generation of knowledge in the form of guidelines for design that raises awareness about air quality. This stage started with prototyping the first bio-inspired textile interactive artefact *Home Pharmacy*, made of a textile wall-hanging and loose fragments of paper. Reflection on this artefact informed the designing and making of a series of small-scale and medium-scale textile samples, which were used as inspiration for the development of two other bio-inspired textile artefacts (e.g. *Remedial Landscape* and *Nest Engagement*). These three artefacts were then evaluated through the first adoption experiment (a trial adoption experiment) whose main goal was to identify if engaging with the artefacts through bio-inspired interactions contributed to raising participants’ awareness about air quality. An interpretation of the results of this adoption experiment informed the designing and making of five other artefacts, which together with one artefact from the first adoption experiment, were evaluated through another adoption experiment (the second adoption experiment). The findings from this second adoption experiment led to the establishment of guidelines for bio-inspired design that raises awareness about air quality. At the end of this stage, the artefacts were also tested through comparative analysis with the contemporary designs that raise awareness about air quality (discussed in section 2.3.2, p. 42). The results of this analysis revealed the uniqueness of the approach utilised to raise awareness. Research stage 2 involved testing the guidelines for design that raises awareness about air quality in the context of an undergraduate studio course on bio-inspiration. An analysis of student’s projects which integrated the design guidelines revealed their applicability in design, how effectively they communicate, that is how the guidelines were understood and the challenges that occurred in their application process. This research stage ended with designing and making *Bio-inspired Awareness*, which demonstrates how the guidelines can be applied in design and is intended to assist the designers with the process of applying the guidelines since full visual documentation of the artefact is meant to accompany the guidelines. In addition to the methods listed above, reflection and visual mapping (mostly in the form of matrices and flow charts) were used at almost every stage of this research.

4.2. Research through design

According to Martin & Hanington (2012, p. 146) ‘research through design is constituted by the design process itself including materials research, development work, and the critical act of recording and communicating the steps, experiments and iterations of design’. Laurel (2003, p. 82) refers to it as being constituted of ‘projects and practices that serve as experiments through which they (designers) interrogate their ideas, test their hypothesis and pose new questions’, and in which critical reflection is necessary, while Zimmerman, Stolterman & Forlizzi (2010, pp. 310-313) define it as an ‘inquiry process revolving around the making of a product, service, environment, or system’ and as ‘the process of iteratively designing artifacts as a creative way of investigating what a potential future might be’. Koskinen et al. (2011, p. 5-6) referred to it as ‘design research in which construction – be it product, system, space or media – takes centre place and becomes the key means in constructing knowledge. They place a high emphasis on the artefacts being created by describing it as ‘research in which something is actually built and put to use. Not only concepts, but materials’ (Koskinen et al., 2011, p. 7). Most recently, Stappers & Giaccardi (2019) in their article about RtD published on the Interaction Design Foundation website operationalized RtD as ‘creating knowledge through a process in which design artefacts, notably prototypes, are made, tried out, and reflected upon’, an iterative process of developing prototypes in which they would ‘become established as the chief elements in the process of generating and communicating knowledge’. In this research, the RtD process is characterised by a hands-on approach that involves iterative prototyping, testing, and analysis of textile artefacts with the goal to ‘gain actionable understanding of a complex situation, framing and reframing it’ (Stappers & Giaccardi, 2019). In this sense, here, the RtD process started with step (1) the development of a textile artefact for home, *Home Pharmacy*, followed by step (2) the development of textile samples, continued with steps (3) and (4) the iterative designing, making and testing of two collections of textile artefacts, and step (5) the establishment of the design guidelines and testing of the guidelines, and ended with step (6) the designing and making of *Bio-inspired Awareness*. The phases of the RtD process in this research are presented in Figure 4:1.

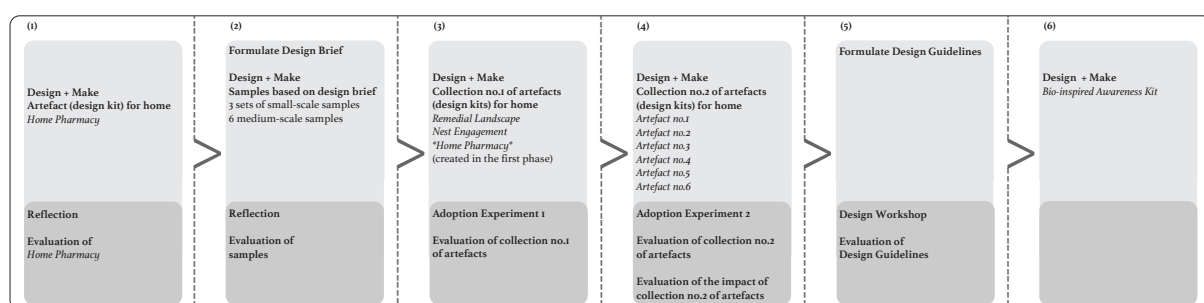


Figure 4:1 Overview of the research through design phases

4.2.1. The role of prototypes in research through design

‘If there is a unique character to design research in comparison to research approaches in other fields, it is likely to relate to the role of and focus on designed things as components of the research process’ (Wensveen & Matthews, 2015, p. 262). Simply put, designed things or prototypes are ‘any

representations of a design idea, regardless of medium' (Houde & Hill, 1997, p.3). Stappers (2013, p. 86) defines them more in-depth as 'things we make, which allow us to see how something new might be or might not be through the process of making and testing' and emphasises the central role they can play in design research 'prototypes are as much about failing and changing course as they are about demonstrating and proving. In that sense, they can be seen as research instruments, both for exploring new directions and for validating expectations' (Stappers, 2013, p. 86). Similarly, Buxton (2007 cited in Lim, Stolterman & Tenenbergh, 2008, p. 72) sees them as 'design-thinking enablers deeply embedded and immersed in design practices and not just tools for evaluating or proving successes or failures of design outcomes'.

At the 'Prototypes: craft in future tense' symposium in 2010 it was articulated that there are two main design research approaches to the use of prototypes: the generative and explorative approach (in which prototypes are used for example as a way to experience a future situation, or as a prop to carry activities and stories which involves open-ended explorations), and the hypothesis testing approach which fits into the evaluative research type (Stappers, 2013; Stappers, Visser & Keller, 2015; Stappers & Giaccardi, 2019). Here, the RtD process employs prototypes/ designed things in the form of textile artefacts, as a means to test a hypothesis and generate knowledge within the field of research (Gaver, Dunne & Pacenti, 1999). Seen as research instruments, the textile artefacts developed are 'different than design practice artefacts in that the intent going into this research is to produce knowledge for research and practice communities, not to make a commercially viable product' (Zimmerman, Forlizzi & Evenson, 2007, p. 499). As a result, the prototypes in their role as research instruments are seen as 'object of analysis', that 'figure in an argument' and 'help demonstrate a new and valuable contribution to the knowledge of a field' (Wensveen & Matthews, 2015, p. 272).

A prototype is defined by its level of fidelity (Martin & Hanington, 2012). A low-fidelity prototype is common throughout the early ideation process and can take the form of sketches, or storyboards, while a high-fidelity prototype can have the appearance of the final product in look and feel, and sometimes even the basic functionality. RtD designers 'put a great effort in creating a prototype with a desirable aesthetic that looked as if it could be a product' because it is important for the user interaction to be convincing (Stappers & Giaccardi, 2019). In this research, the artefacts developed are high-fidelity prototypes, because the goal is to create an experience that is convincing, similar to having the artefact in the home permanently.

4.2.2. Cultural probes

A concept introduced by Gaver, Dunne & Pacenti (1999) through their *Presence* project, cultural probes were created to gain an impressionistic view of participant cultures, preferences, beliefs, and desires, which could start a dialogue between the designers and the users. This two-year project taking place in three communities near Oslo, Amsterdam, and Pisa, had as a goal the investigation of novel interaction techniques to increase the presence of the elderly in their local communities. The cultural probes which consisted of postcards, maps, disposable cameras, photo albums, and diaries, were given to the participants in person and returned to the researchers through the mail after a month. According to Gaver, Dunne & Pacenti (1999, p. 27), the probes 'were not designed to be

analysed, nor did we summarise what they revealed about the sites as an explicit stage in the process. Rather, the design proposals we produced reflected what we learned from the materials', 'they didn't directly lead to our designs. They were invaluable in making us aware of the detailed texture of the sites' but the design process was 'also influenced by our pre-existing conceptual interests, our visits to the sites, anecdotes and data about the areas from the local coordinators, and readings from the popular and specialist press' (Gaver, Dunne & Pacenti, 1999, p. 29). The main purpose of this method was to gather 'inspirational data' that would stimulate the imagination rather than define a set of problems, and its real strength was that the materials were designed and crafted specifically for this project, for those people, and their environment (Gaver, Dunne & Pacenti, 1999). Gaver et al. (2004) continue to use cultural probes as a method that values exploration, play, and subjective interpretation, by seeing it as a way of collecting 'inspirational responses from people – not comprehensive information about them, but fragmentary clues about their lives and thoughts' (Gaver et al., 2004, p. 53) elicited by evocative tasks. Mattelmaki (2006) (which refers to cultural probes as design probes) and Peeters et al. (2013) however, argue that the role of probes extends beyond inspiring and stimulating design researchers' imagination, first, to understanding human phenomena by 'gaining access to more versatile, experimental and subjective user data' (Peeters et al., 2013, p. 2880) and second, to exploring design opportunities by 'acquiring insights in future (functional) requirements of a more targeted product' (Peeters et al., 2013, p. 2880). In addition, while Gaver, Dunne & Pacenti (1999) and Gaver et al. (2004) emphasise the importance of uncertainty when it comes to working with cultural probes, and of designerly ambiguity of probing, Mattelmaki (2006, p. 72) argues that 'in the name of efficiency, it is still sensible to make some assumptions and decisions on the objective of the studies', and recommends the researchers asking themselves what they want to learn as a way to identify what to probe.

Celikoglu, Ogut & Krippendorff (2017) see cultural probes as a supplement to ethnography-inspired methods (e.g. interviews). When viewed from this perspective, cultural probes are very helpful with the collection of data in environments where the researcher's presence can distract the participants from their daily behaviour (such as home environments), since it relies on participants' self-documentation (Celikoglu, Ogut & Krippendorff, 2017). In regard to this, Mattelmaki (2006) clarifies that unlike self-documentation in ethnography in which activities are meant to be documented as accurately as possible, and without any interference, probes are meant to provoke and stimulate participants' imagination. This is particularly the case of the probes created by Dunne & Raby (2001) for their Placebo project⁵⁵, where artefacts (seen as provocative instruments) were introduced into the participants' homes to inspire new understanding about their relation with electronic objects.

There is no recipe on how the cultural/design probes should look, so each design researcher has flexibility in terms of how to construct them. Ideally, they would be framed in such a way that the participant will find them relevant, engaging, and easy to use (Muratovski, 2016). Celikoglu, Ogut & Krippendorff (2017, p. 87) lay further light on this:

'A probes package, prepared by designers or researchers, or by both in partnership, usually includes task books containing daily assigned tasks, as well as any equipment needed to

⁵⁵ The Placebo project (Dunne & Raby, 2001) consists of eight prototype objects that are placed in people's homes to investigate people's attitudes to and experiences of electromagnetic fields in the home.

facilitate these tasks. These tasks call on users to document their experiences, including actions, thoughts, attitudes, hopes, and moods in physical, social, and cultural contexts’.

Celikoglu, Ogut & Krippendorff (2017) also mention that because of the open nature of the method the tools utilised in cultural probes studies can be improved, adjusted, modified, or reinvented. Mattelmaki (2006) lists a variety of ways to probes, for example probing by means of a diary, of photographs, of open questions, of maps, and even reminders and arousers which can ‘tune up the users’ thought and imagination’ (Mattelmaki, 2006, p. 84). They also aim to remind researchers that the use of probes involves conscious risk-taking and that surprises are also natural to this method, so probes that are ‘too neat and easy-to-use’ (Mattelmaki, 2006, p. 84) might not function in the way they are meant to.

Even though informal and specifically casual, cultural probes are ‘thoughtful in their aesthetic craft, message, and delivery, created to inspire delight and respect, response and return’ (Martin & Hannington, 2012 p. 54). The primary goal of an aesthetically pleasant and interesting appearance is to motivate and encourage participants to do the work requested and to make them feel that they are taken seriously as ‘experts of their own experiences’ (Celikoglu, Ogut & Krippendorff, 2017, p. 88). Also, ‘when the appearance of the probe is well-designed, they can be used for demonstrating and reporting the underlying research in a visually interesting way’ (Mattelmaki, 2006, p. 49). It is important however to remember that, probes are not finished products or solutions, they are research tools used to learn more about people’s lives, behaviours, thoughts, and so on (Peeters et al., 2013).

Both Mattelmaki (2006) and Celikoglu, Ogut & Krippendorff (2017) argue that a small number of participants is meaningful for a probes study. This is due mostly to the qualitative nature of the research, which tries to describe and understand the phenomenon and individual people’s thoughts, and of the time invested in the generation of the probe packages, in considering their logistics, conducting interviews and interpreting the results. Mattelmaki (2006) further adds that an adequate size of a target group is between five and ten people, and as little as one individual representing the target group is sufficient to test the probe kit before the actual study. This testing allows the researcher to get feedback on various things (for example, the functionality of the probe, the language, the time it takes to do the task) and therefore have the correct information for the actual participants.

4.2.2.1. The role of textile artefacts as cultural/design probes

While the most important characteristic of cultural/design probes is ‘to render participants “reflective practitioners” of their experiences’ (Celikoglu, Ogut & Krippendorff, 2017, p. 88), since their introduction in 1999 they have been utilised in user studies with a variety of approaches. This lead to the development of a variety of cultural probes, including but not limited to: domestic probes (meant to gain inspiration about people’s lives at home), technology probes (meant to investigate aspects of people’s relations with technology), empathy probes (meant to ‘record diverse human material from various areas of life and project images of people’s experiences onto corporate design teams’, Mattelmaki, 2006, p. 48), mobile probes (meant to ‘document changing contexts and

actions', Mattelmaki, 2006, p. 57), and experience probes (mean to help identify 'what it might be like for them to engage with a future product, space or system' they are designing, Buchenau & Fulton-Suri, 2000 cited in Peeters et al., 2013, p. 2882). In this research, the use of textile artefacts in the home environment places them in the category of domestic probes. In this sense, the textile artefacts are prototypes that were sent out to domestic environments as research instruments, with the primary role to collect opinions, but also feelings about the experience and to record observations about the interactions with the textile artefacts when they happened. Because the focus is on the experience of interacting with the artefact, the questions in this probing study are: What is it like to interact with the artefact? and What did the experience of interacting with the artefact make you think of? Because in this research the focus was on how each participant experiences the interaction with the artefact, the artefacts are seen as supplements to a phenomenological study (where the focus is on the individual experience) rather than an ethnographic study (where the focus is on the group experience) (Muratovski, 2016).

One difference between the cultural/design probes as described by the literature and the use of textile artefacts in this research is that while cultural/design probes tend to be used in the exploratory stages of research with the goal to collect information that inspires the researchers and information that could be used to inform the design of objects; here, the textile artefacts are used in the evaluative stage of research, similar to the way the electronic probes were used in the Placebo project by Dunne & Raby (2001). In contrast to the Placebo project that was a speculative project whose goal was to provoke participants re-think their relation with electronic objects, the primary goal of my research is to test the textile artefacts' function as a form of engagement and possible agent of change.

4.3. Theoretical frameworks

Figure 4:2 illustrates the methods + techniques, tools, as well as the theoretical frames for each of the research phases. The top part of each horizontal section (lighter grey) lists the methods + techniques, tools, and the theoretical frames used for the generation of practice, while the bottom part (darker grey) lists the methods + techniques, tools, and the theoretical frames used for the evaluation of practice, both with reference to research stage 1 and research stage 2.

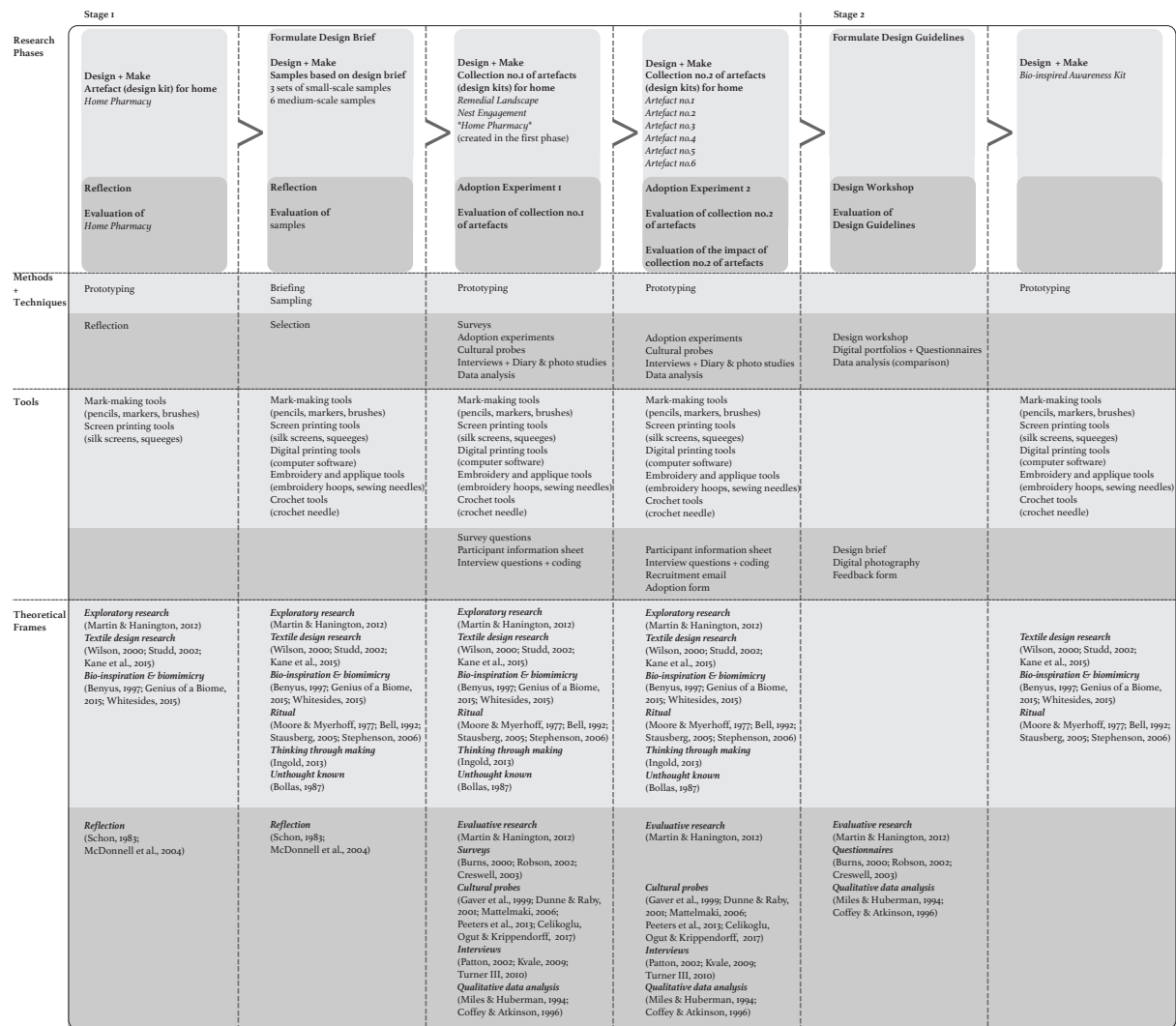


Figure 4:2 Overview of methods and techniques, tools and theoretical frames

4.4. Methods used in the development of practice

In the early stages of the development of practice, the research is exploratory and is focused on the design and making of one bio-inspired textile artefact (e.g. *Home Pharmacy*), and of a collection of small-scale and medium-scale samples. Research at this point is purposefully flexible, and the emphasis is on intuitive making. It involves qualitative methods of data collection (e.g. prototyping and creative and systematic sampling) and analysis (e.g. reflective practice), and working with a hands-on approach. This exploratory research informs the development of concept (design brief) and prototype iteration in the form of interactive textile artefacts for home. One main characteristic of the methodological approach used in the development of practice is the combination of artistic research (emerging from my background in textile design) with technical research (emerging from working with the bio-inspiration process). This represents an interdisciplinary approach to textile design research which involves creative intention underpinned with technical inquiry (Kane et al., 2015).

4.4.1. Bio-inspired textile design process

Discussing the textile design process Wilson (2000, p. 2) listed as its phases ‘identification of need/requirement, through research, generation of initial design ideas, design development and testing to ultimate product specification’, while Studd (2002) identified five phases of the textile design process:

- (1) ‘Planning: sourcing work and planning design brief;
- (2) Research and analysis: briefing research collection and analysis of information;
- (3) Synthesis: design creation and initial sampling;
- (4) Selection: collection development;
- (5) Production: sampling, manufacture through to evaluation’ (Studd, 2002, p.43).

Because this research is investigating how bio-inspiration can be applied in textiles, here, the design process weaves the steps of the textile design process with the steps of the bio-inspired design process (as articulated in section 3.3.2, p. 66) the result being a bio-inspired textile design process. In articulating this process, the aim was to first look at the phases of the textile design and bio-inspiration processes and then to find an equivalent between them, as visualised in Figure 4:3. Following that, the five phases (A, B, C, D, and E) and the nine steps of the bio-inspired textile design process used in this research (Figure 4:4) were formulated.

Textile design process		Bio-inspiration process
Identify the need through research	Source work and plan design brief Brief the research collection and analyse information	Identify the challenge Biologise the challenge Formulate design brief
		Observe the biological model Abstract the biological model
Generate initial design ideas	Create designs and initial sampling	Imitate the biological model through (a) sketches
Develop the design	Develop collection, sample, manufacture	Imitate the biological model through (b) samples/artefacts
Test	Evaluate	
Ultimate product specification		

Figure 4:3 The phases of the textile design process as articulated by Wilson (2000) and Studd (2002) and the phases of the bio-inspiration process as articulated in section 3.3.2

A	(1)	<i>Identify the design challenge</i>
	(2)	<i>Biologise the design challenge</i> by asking How does nature...? and by surveying the scientific literature in order to identify the biological model that can be used as inspiration
	(3)	<i>Formulate the design brief</i>
B	(4)	<i>Observe the biological model</i> in order to identify the core biological principle that is used to accomplish the function
	(5)	<i>Abstract the biological model</i> in order to formulate the design principle by describing the core biological principle without using biological terms
C	(6)	<i>Imitate the biological model by emulating the design principle with sketches and textile samples</i>
	(7)	<i>Imitate the biological model by emulating the design principle with textile artefacts</i>
D	(8)	<i>Evaluate the textile artefacts</i>
E	(9)	<i>Refine the textile artefacts</i>

Figure 4:4 The bio-inspired textile design process in this research

Regarding phases D and E of the process articulated above, there is a distinction between phases D and E of the textile design process and phases D and E of the textile design research process. While evaluation in the textile design process refers to testing the physical properties, durability and tactile characteristics of the textiles created, and then refining them; evaluation in this textile design research project, involves testing a hypothesis through the deployment of artefacts (seen as research instruments) in the home.

4.4.2. Prototyping

According to Martin & Hanington (2012, p.138) prototyping is a synthesis technique that involves ‘the tangible creation of artefacts at various level of resolution, for development and testing of ideas’. Lidwell, Holden & Butler (2010, p. 194) define it as ‘the creation of simple, incomplete models or mock-ups of a design’ that ‘provides designers with key insights into real-world design requirements, and gives them a method to visualise, evaluate, learn, and improve design specifications prior to delivery’. While these definitions are mostly referring to prototyping as a method used in the development of commercial products, they also apply to this project, where prototyping is used as a research method, that has as a goal the materialisation of creative ideas inspired by nature into hand-crafted textiles, that initially take the form of samples, followed by textile artefacts. Here, the prototyping process is guided by the steps 4 (observing the behaviour), 5 (abstracting the behaviour), 6 (imitating the behaviour with sketches and samples) and 7 (imitating the behaviour with textile artefacts) of the bio-inspired textile design process, and had as main goal the translation of bird behaviour into physical artefacts that could be interacted with.

4.4.3. Creative and systematic sampling

The researcher set out to explore various ways of translating the bird behaviour into textile work, using her designer skills and the expertise in textile design with a focus on surface design. The work started with using a textile design framework (Wilson, 2000) that considered what are the most appropriate materials, what techniques will be used, and what tools are needed. The sampling in the

early stages of the research had at its core material-led intuitive exploration. This identified the materials, techniques, and tools that can be used to translate the bird behaviour into textile work. It was through playful exploration that the affordances and constraints of the textile medium could be learned intuitively (McCullough, 1996) which built upon a cumulative tacit knowledge of textile processes and material properties. These explorations took the form of interactive small-scale textile samples inspired by the nest behaviour of the blue tit. The creative sampling was followed by more systematic sampling, which involved iterative experiments carried out on textiles, with the goal to expand the library of material interactions. The results of the systematic sampling were the medium-scale textile samples.

4.4.4. Thinking through making

The making of the samples and artefacts followed a thinking through making approach. 'Thinking through making' is a process that generates knowledge, and a process of knowing from the inside in which the practitioner 'allows knowledge to grow from the crucible of our practical and observational engagements with the beings and the things around us' (Adamson, 2007 cited in Ingold, 2013, p. 6). Ingold (2013) describes this as a 'process of improvisation, of finding one's way', not the projection of a ready-made thought on matter, but as 'an ongoing, binding together of material flow and sensory awareness' in which practitioners find the grain of things and bend it to their purpose. He names this 'intuition in action' (Ingold, 2013, p. 25). In his vision 'nothing is ever finished as an artefact leads to something else' (Ingold, 2013). In this research, the samples in the early stage of research are completely unexpected and are the result of the active engagement with the materials. Grand & Joan (c2012, p. 155) also argue that when it comes to making, design is understood as 'an inherently intuitive and imaginative practice'. They refer to this as a 'designerly' way of creating in which the emphasis is on the process of making and the creation of artefacts. Similarly, in my research, the making of each sample and artefact generated the ideas for the next one. The making started with a few guidelines, which were then explored in a variety of ways and using a wide range of media. The process was fluid and every element of design and decision, for example using a particular process was a response to what was happening at the moment with just a few variables changed. This new knowledge created was previous knowledge that has developed and taken new forms, by being applied in different ways as a response to the engagement with materials.

Discussing the concept of 'unthought known', where thought is understood as 'that which has been mentally processed accurately' Bollas (1987, p. 280) refers to it as 'that which is known but not yet thought'. He further writes:

'the unthought known becomes thought in the same manner that is partly developed: establishment through object relations. It is only through the subject's use and experience of the other that mental representations of that experience can carry and therefore represent the idiom of a person's unthought known' (Bollas, 1987, p. 280).

Bollas (1987) also emphasizes the need to push oneself beyond what is known in a certain moment, to be engaged with a thought even if one does not know exactly what is about because that allows

oneself to imagine an idea without having to define it clearly. It is this idea of trusting oneself at the beginning and throughout the act of making that characterizes this practice; of having the confidence that the knowledge needed to achieve the set goal is there, and it will be made visible at the appropriate time.

4.5. Methods used in the evaluation of practice

4.5.1. Adoption experiments

In testing the artefacts, the adoption method Dunne & Raby (2001) used in their Placebo project was utilised. The method involves participants volunteering to have an object in the home for a certain time at the end of which data is collected through interviews. As a result, the steps of this method, as used in this research, include: (1) the recruitment of participants, (2) the adoption of the artefacts, and (3) the collection of data through interviews, diary studies, and photo studies. While Dunne & Raby (2001) used this method to elicit information from the participants, to provoke and speculate, here this method is used to test a hypothesis⁵⁶ (Figure 4:5) in order to develop conclusions.

If participants interact with the textile artefacts repeatedly and are in this way replicating the nest behaviour of the blue tit that has been given ritual qualities, and are made aware of this behaviour, and
If the textile artefacts are mimicking the biological model beyond the behaviour, by replicating the plants the bird is bringing into its nest (through the use of essential oils) and its environment (through the use of materials and imagery that create an aesthetic inspired by the natural world)
Then engagement with the textile artefacts could contribute to raising participants' awareness about the health of the home environment with a focus on air quality.

Figure 4:5 The hypothesis in this research

4.5.1.1. Semi-structured interviews

Semi-structured interviews were used to collect qualitative data from the participants in regard to their experience of having an artefact in the home for two weeks. Three sets of interviews took place in total. The first one at the end of the first adoption experiment, the second at the end of the second adoption experiment, and the third one nine months after the second adoption experiment. All interviews followed an interview guide as recommended by Flick (2009).

⁵⁶ Hypothesis (Web Centre for Social Sciences Research Methods, 2018) is a specific prediction, that describes in concrete (not theoretical) terms what is expected to happen in a study.

The four stages of this method as used in this research include:

- (1) Designing the interviews
- (2) Conducting the interviews
- (3) Transcribing the interviews
- (4) Analysing and interpreting the interviews

Design

Prior to conducting the semi-structured interviews (Turner III, 2010; Kvale, 2009; Patton, 2002), an interview guide consisting of a list of questions that needed to be covered during the conversation was prepared. The questions included in the guide were open-ended therefore the informants had the freedom to express their views in their own terms. There was a mix of factual questions (e.g. where did you place the artefact?) and opinion-seeking questions (e.g. what do you think about the narrative that came with the artefact?). The interviews were primarily aimed at investigating the role that interaction with the artefacts had in raising awareness about air quality. Secondly, the interviews were aimed at identifying any other roles the artefact might have played in the home, and at getting feedback on the design of the artefacts in regard to their scale and installation, and the interactions they require (in the first adoption experiment with the purpose to make them as easy as possible to be integrated in the home during the second adoption experiment, and in the second adoption experiment with the purpose to verify if the changes implemented in the design of the artefacts were successful). In addition, because the first adoption experiment was a trial adoption, the questions at the end of the first adoption experiment were also aimed at identifying any issues that might arise in the application of the adoption method. Figure 4:6 illustrates the areas of investigation and how the questions asked relate to each area.

Aspects investigated	Questions asked
The role of the technical mimicry of the nest behaviour in raising awareness about air quality	<p>Where was the artefact placed within the home, and why did you decide to place it there?</p> <p>Do you think the placing affected the way you interacted with the artefact? How? For how long, and how often did you interact with the artefact?</p> <p>What happened after you interacted with the artefact for the first time? Where you more inclined to want to engage with it again? Why, or what not?</p> <p>When where you most likely to interact with the artefact? Why do you think is that?</p> <p>Do you remember what the artefact is about according to the description in the Participant Information Sheet? Do you think that knowing the narrative behind the artefact has any importance? If yes, what is the importance?</p> <p>How did you find the activity (what you were asked to do)? What did it make you think of? Why do you think that is?</p> <p>Did you discover anything upon physically doing the activity, that is interacting with the artefact?</p> <p>Do you think that your actions had an impact on your home environment, and if so, what was this impact?</p> <p>Where there any thoughts/actions that occurred as a result of interacting with the artefact? What type of actions? With what goal?</p>
The role of the conceptual mimicry of the nest behaviour in raising awareness about air quality	<p>The loose fragments are impregnated with essential oils. What do you think the role of the essential oils is? Did the fact that they were released as part of the interaction with the artefact did anything for you?</p> <p>The artefact references the flora of the natural world. What did this particular imagery make you think of?</p> <p>How much attention did you pay (with emphasis in the last two weeks):</p> <ul style="list-style-type: none"> to the level of dust in your home? to the fumes produced while cooking? to the use of paints, varnishes, solvents, cleaning supplies in your home? *only asked during the first adoption experiment to the time you opened your windows? *only asked during the first adoption experiment
The design of artefacts	<p>What did you think about the scale of the artefact? Was it easy to find a spot for the artefact in your home?</p> <p>What did you think about installing the artefact? Do you have any suggestions on how would you like it displayed?</p> <p>How did you find the timing of the activity (what you were asked to do)? Would you wish they were longer? Shorter?</p> <p>The engagement with the artefact involves a certain level of skill. Do you think the level was appropriate? Do you think it should require more/less involvement?</p> <p>Could you think of any similar actions you would like to see translated in a textile artefact?</p>
The other roles the artefacts played while in the participants' homes	<p>When you talk to your friends about the artefact how do you describe it? / If you were to talk to your friends about the artefact how would you describe it?</p> <p>What did you use it for? Did it play any function in your home life?</p> <p>Did other people interact with the artefact? If so, in what circumstances?</p> <p>What kind of people do you think might want to own an artefact like this and why?</p> <p>If you were to give the artefact to someone what would you tell that person about the artefact?</p> <p>What was your favorite part of this experience?</p> <p>If you were to think of the overall feeling this gave you, or the thought it generated what would you say it was?</p>
The process of adoption	<p>What did you think of the artefact when you read the Participant Information Sheet (and the Adoption Form in the second adoption experiment)?</p> <p>For how long did you have the artefact in the home before you interacted with it?</p>

Figure 4:6 Interview guide with questions in the order they were analysed

Conduct

The three interviews at the end of the first adoption period took place digitally. The six interviews at the end of the second adoption period were in person, as well as the five interviews nine months after the second adoption experiment. All interviews were 45 minutes to one hour on average and were audio-recorded.

Transcribe

Transcription is an interpretative process, where 'the conversational interaction between two physically present persons becomes abstracted and fixed in a written form' (Kvale, 2009, p. 177). The procedure for transcribing did not involve transcribing the interviews verbatim (i.e., frequent repetitions, pauses, and so on were avoided), instead the interview was transformed into a written style. During this process, each interview conversation was structured in a form amendable to closer analysis.

Analyse and interpret

Where analysis can refer to a more scientific procedure, interpretation allows the structuring of data less systematically in order to support a creative and open process (Mattelmaki, 2006).

4.5.1.1.1. Operationalisation of the concept of air pollution at home

In order to gather insight into the level of awareness about air quality, before interviewing participants the concept of 'air pollution at home' was operationalised. Operationalisation (especially in social sciences) is the process by which a researcher defines how a concept that is not directly measurable (e.g. air pollution at home) is measured, observed, or manipulated within a particular study (Psychology, 2017). Surveys are known as a method of collecting self-reported information from people about their thoughts, perceptions, attitudes and so on (Burns, 2000; Robson, 2002; Creswell, 2003; Martin & Hanington, 2012). Here, surveys were used in order to operationalise the concept of air pollution at home. They also seemed appropriate because they are efficient methods in collecting data in a short amount of time, and they allow the collection of versatile data. Surveys can take the form of questionnaires (self-completed or read to participants) or interviews (conducted in person, by phone, or through various communication technologies). Here, the survey took the form of an inquiry sent via a social media platform (e.g. Facebook Messenger), in which twelve of the researcher's Facebook contacts were asked to name five actions that make them aware of the level of air quality/pollution in the home.

4.5.1.2. Diary studies

Diaries or journals are described by Martin & Hanington (2012, p.66) as 'guiding artefacts' that 'allow people to conveniently and expressively convey personal details about their daily life and events', while Mattelmaki (2006, p. 76) refers to a diary as a 'typical probing instrument, focusing on routines and feelings'. Both Martin & Hanington (2012) and Mattelmaki (2006) argue that these objects are used in the exploratory stage of research, as a way to gather insight into the life of

participants, which is then used for inspiration in the generative stage of design. In this research, however, they are used in the evaluation of research. Their primary role is to function as logs, as the journal entries provide another way to identify the number of times the participants interacted with the artefact, and if there was a certain pattern in regard to the day of the week or the time of the day they interacted with the artefact. In addition, the participants were asked to describe the activity they performed. As a result, other information about their engagement with the artefact could arise. Participants were asked to record the following as listed in Figure 4:7.

Aspects investigated	Information requested
The potential that artefacts have in generating a repetitive engagement that could be framed temporarily.	To note every time they engaged with the artefact. To note the day of the week and the time of the day when they engaged with the artefact. To note the approximate time they spent engaging with the artefact.
The additional roles of the artefacts.	To describe the activity they performed.

Figure 4:7 Aspects investigated in the journals

The diaries are 12.5 cm by 8.5 cm notebooks that were issued to the participants in person. On the inside of the journal cover, the instructions on how and when to complete the requested entries are attached, as seen in Figure 4:8.

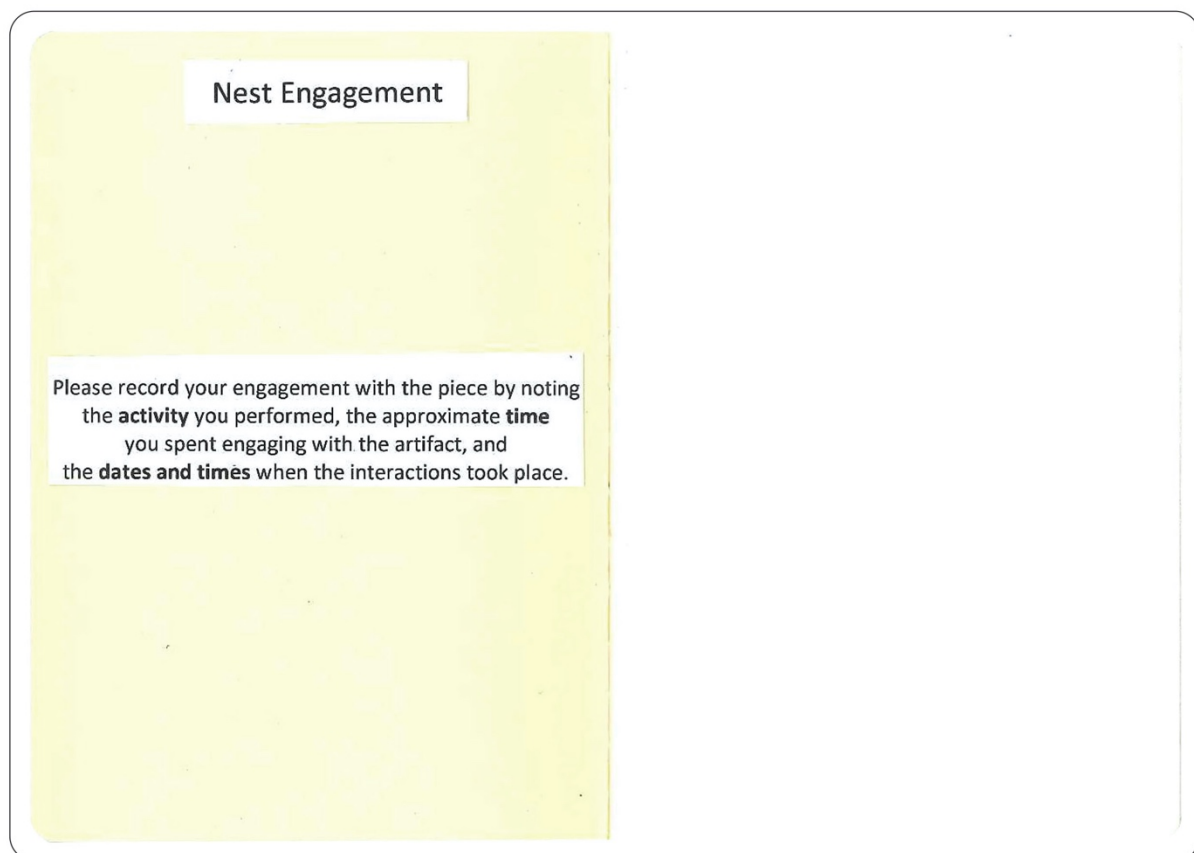


Figure 4:8 Instructions about recording information in the journal

4.5.1.3. Photography studies

According to Martin & Hanington (2012) just like with diary studies, photography studies should take place during the exploratory stage of research as a way to understand the world of users. In that respect, they 'invite the participant to photo-document aspects of her life and interactions, providing the designer with visual, self-reported insights into user behaviour' (Martin & Hanington, 2012, p. 134). Participants are either provided with a camera or given instructions on how to use their own camera to collect information for the research. They should also be informed as to what type of images to document. In this research, the photographs were used in the evaluative stage of research. Instructions were given to the participants as to what to photograph (e.g. the artefact once installed into the home) and what to use to take the photograph (e.g. their smartphone). As a result, the photographs were taken digitally and were used to record the presence of the artefacts displayed in the home. Their main function was to underline the importance of the study to the participants as by asking participants to photograph the artefact while installed in the home will remind them that their participation is part of a study, and will highlight the responsibility that comes with this.

4.5.2. Workshop

Martin & Hanington (2012) discuss design workshops as a method for evaluating design methods, tools, guidelines, and so on. In this research, the guidelines for bio-inspired design that raises awareness about air quality have been evaluated through a workshop (i.e., undergraduate level craft/design course titled *Bio-inspired Artefacts*).

While a design workshop is most common in generative research when it takes the form of a participatory session focused on co-design exercises, here the workshop was used in the evaluative stage of research, to test the applicability of the guidelines for bio-inspired design that raises awareness about air quality, and to identify what kind of designs can the guidelines inform, and what are the challenges that designers might have in their practical application in design (if any). In this context, the researcher took the role of facilitator (Hunter, 2007) and focused mainly on the transfer of knowledge to an individual, rather than a facilitator whose focus is on the group dynamics.

The procedure for the workshop involved: (1) formulating a project brief that was asking students to create an artefact that incorporates the guidelines for bio-inspired design that raises awareness about air quality at home; (2) designing and making of the artefacts by the students; and (3) collecting data through digital portfolios (which included photographs of the artefact, and information about the research, design and making processes) of the students' projects, and feedback forms which included additional data about working with the guidelines.

4.5.3. Data analysis

The data from the adoption (interviews and journals) and workshop was analysed using Miles & Huberman's qualitative data analysis method discussed in their *Qualitative Data Analysis* book from 1994. The key activities of this method include data reduction, data display, and drawing conclusions. In this research, the process of data reduction involved: clustering textual data around each aspect investigated, coding data line-by-line manually using underlining as a tool that allows selecting data related to the aspect investigated, and extracting the words and/or sentences underlined and using note-taking as a tool that allows to organise the data clustered around each aspect investigated. Miles & Huberman (1994) refer to coding as the process of using labels for assigning meaning to the descriptive or inferential information collected during the study. The labels can be attached to chunks of varying sizes (e.g. words, sentences, phrases, or whole paragraphs, connected or unconnected to a specific setting). The process of data display in this research involved using structures (i.e., tables) that present data in an organised and compressed visual format so that an overview and understanding of the whole can be gained. The structures show the link between concepts and can bring relevant data together to encourage the drawing of conclusions. The purpose of the data display is to assist with categorizing the data in such a way that it can be read easily and therefore easily interpreted. For drawing conclusions, questioning was used as an intellectual tool to assist with interrogating data from interviews and journals.

This is an interpretative reading of the data, which according to Mason (2002) involves the researcher in constructing a version of what she thinks the data mean or what she thinks can be inferred from the data. Interpreting the data means creating relationships, comparing, identifying causes and consequences, and looking for contrasts and irregularities (Patton, 2002; Coffey & Atkinson, 1996).

4.5.3.1. Comparison

Seen as the main intellectual tool of analysis, comparison, is used to discover similarities and/or differences between data (Gray & Malins, 2004). In addition to being used in the interpretation of data collected from the adoptions and the workshop, in this research, comparison is also used to analyse the textile artefacts that have been created against the contemporary design that raises awareness about air quality. The goal of this comparative analysis is to emphasise the uniqueness of the approach developed throughout this research (i.e., raising awareness through interaction with bio-inspired textile artefacts). The criteria for this comparative analysis is the one established in the second chapter (see section 2.3.2, p. 42).

4.5.4. Ethical Considerations

In terms of the adoption procedure, participants were informed a priori of the research purpose and what their contribution is in a Participation Information Sheet. All participants were documented with informed consent.

What the participants might gain out of their involvement in this research (i.e., the time they put in) is important to consider as part of ethical considerations. While there were limited health and safety risks associated with taking part in the adoption experiments (because the textile artefacts incorporated essential oils), having the artefact in the home for the two weeks, engaging with it, and smelling the scent of essential oils could be a positive experience. And, inspired by these artefacts, the participants could continue using essential oils in their homes. It is important to mention that no claim that the introduction of essential oils in the home purifies the air in the home was made during this process.

4.5.5. Reflection

In his seminal book, *The reflective practitioner* first published in 1983, Donald Schon coined the terms reflection-in-action and reflection-on-action which are used to account for how practitioners cope with experiences and learn from them. While reflection-in-action is described as reflecting on the practice while it happens, the reflection-on-action approach involves reflecting on how practice developed after the event has happened. It involves recalling memories and experiences and then reflecting on them. In regard to this, Schon (2002, p. 26) argues 'we reflect on action, thinking back on what we have done in order to discover how our knowing-in action may have contributed to an unexpected outcome'. Since then, the important role reflection plays in design research has been emphasised by a series of researchers. For instance, Lowgren & Stolterman (2007) in their book *Thoughtful Interaction Design*, highlight the role reflection (i.e., thoughtful design) plays in designing meaningful interactive systems. McDonnell, Lloyd & Valkenburg (2004, p. 512) describe reflection as 'a kind of standing back, a mental action that distances a person from events so that they can be viewed in a more critical manner', and state that reflection in design plays a major role in learning. Building upon Schon's (2002) descriptions of reflection-in-action and reflection-on-action, McDonnell, Lloyd & Valkenburg (2004) identified two other levels of reflection: interpretation of the events, and emancipation. Reflection-in-action, reflection-on-action, and interpretation played a major role in the critical understanding of the practice developed within this research and in making sense of it. In that respect, reflection-in-action, that is thinking while doing research helped to explain the decision made while developing the practice; reflection-on-action, that is thinking about the practice developed, allowed for a greater understanding of how and why the decisions were made; while interpretation enabled thinking about how findings from one research phase applied to another.

4.5.6. Visual mapping

In this research, visual mapping in the form of concept maps (e.g. network diagrams, flow charts), and matrices is an important technique in sorting and structuring the data collected (Gray & Malins, 2004). While concept maps 'provide a visual representation of dynamic schemes of understanding within the human mind' (MIs, 2004 cited in Wheeldon & Faubert, 2009, p. 69), and help 'demonstrate how people visualise relationships between various concepts' (Lanzing, 1996 cited in Wheeldon & Faubert, 2009, p. 69); matrices, usually made of columns and rows, 'are able of conveying a great deal of information in a compressed space' (Gray & Malins, 2004, p. 145), and are

not only useful for the analysis of data, but also its management. Matrices can be used as a tool for comparison across a data set, but also as a way to obtain 'research outcomes' by interrogating the data collected in relation to criteria established (Gray & Malins, 2004). Here, the concept maps took the form of flow charts (i.e., 'classic method of tracking decision making' [Gray & Malins, 2004, p. 147]) which helped articulate the train of thought, while matrices took the form of tables which included groups of images for comparative analysis. Even though these tools were used all throughout this research, they were mostly used during the two contextual reviews. At that point, the connection between how theory informs practice was visually represented through flow charts, and information about the contemporary practice was organised into matrices that revealed the gap in knowledge.

Visual mapping was an ongoing process, and it consisted of many iterations of the same thought until the map that reflected best the relationship between concepts was created. As a result, the clearly articulated maps included in this thesis were preceded by a series of 'draft' maps, which played a vital role in helping the researcher achieve clarity of ideas.

4.6. Summary of *Methodology*

This chapter discussed the RtD process, the theoretical frameworks for practice, and the methods and tools used throughout this research.

The first section started with a short literature review of the RTD process, which help to formulate the phases of the RtD process in this research, followed by a discussion on the role of prototypes in RtD which here take the form of cultural/design probes. It articulated the role of textile artefacts as cultural/design probes and emphasised a methodological contribution to the theory and practice of cultural/design probes, as the textile artefacts were not used for gathering inspirational information from participants, but as a form of engagement and possible agent of change. The second section used the phases of the RtD process as a structure that allowed to organise the methods, tools, and theoretical frameworks for practice into a matrix that will be used as a guiding tool throughout this thesis. The third section began with discussing the methods and tools used in the development of practice (i.e., textile samples and artefacts), followed by the ones used in the evaluation of the practice (i.e., textile samples and artefacts); and ended with discussing the methods and tools used in the testing of the design guidelines. As a result, prototyping, sampling, adoption, interviews, diary studies, photograph studies, design workshop, and data analysis were discussed as methods that help the researcher reach the main goal and objectives set at the beginning of this thesis. The chapter concluded with emphasising the importance of using reflection and visual mapping as techniques throughout this research.

This chapter guided the development of the textile practice which is described in the next chapter. The next chapter discusses *Home Pharmacy*, the first textile artefact created in this research, articulates the design brief and describes how the textile samples were created as a result of following the bio-inspired textile design process.

5.Design practice: *Home Pharmacy* and textile research

5.1. Home Pharmacy

Guided by the process of bio-inspired textile design, the development of practice started with designing and making *Home Pharmacy*, a textile artefact for the domestic environment. *Home Pharmacy* was a means to develop a proof of concept and submit it through an evaluation before fully defining the design brief. As the first bio-inspired textile artefact developed in this research, *Home Pharmacy* established the procedure for designing and making the upcoming practice, and a reflection on it helped to outline a series of considerations for this practice.

5.1.1. Description of *Home Pharmacy*

Home Pharmacy (Figure 5:1) is an interactive piece for the home, made of a textile wall-hanging and loose leaf-shaped and petal-shaped fragments of paper impregnated with essential oils of lavender (*Lavandula officinalis*) and peppermint (*Mentha piperita*). The work replicates the nest behaviour of female blue tit bird, so one can interact with it by placing the leaf-shaped or petal-shaped fragments on the wall-hanging, in a similar way the female bird is interacting with its nest by bringing plant fragments into it. In order to stay attached to the wall-hanging, the individually packed fragments are foreseen with tiny legs and the panel is cut in various places to allow for the fragments' legs to slide through and stay attached. The four plants depicted on the panel are the four plants the blue tit places in its nest (i.e., daisy, lavender, mint, and yarrow). There are loose fragments from all four plants, but only the lavender and mint fragments are impregnated with essential oils of lavender and peppermint. The artefact was given the name of *Home Pharmacy* as a way to create a tie between theory and practice, a connection between the theoretical framework and its implementation.

The artefact is handmade, as the imagery on the panel has been drawn by hand, and both the wall-hanging and the loose fragments have been screen-printed by hand using photo stencils and textile pigments. The wall-hanging is printed on non-woven linen fabric, while the loose fragments are printed on fine art Arches paper. The choice of paper as opposed to fabric for the fragments had to do with them being firm and easy to handle when placing them on the wall-hanging. While making decisions about the materials used in its making, I followed the biomimicry principle of 'well-adapted design' (Ternaux, 2012), and I took into consideration the principle of integration of materials (Institute of Building Biology + Sustainability, 2019) as a way to design an object that is not harming the home environment in any way (i.e., does not pollute the air). In addition, the artefact is inspired by the concept of bio-utilisation, namely, 'direct use of nature for beneficial purposes' (Pawlyn, 2016, p. 3), that is the use of materials/products from the natural world in the making of objects. In that sense, the artefact incorporates essential oils.

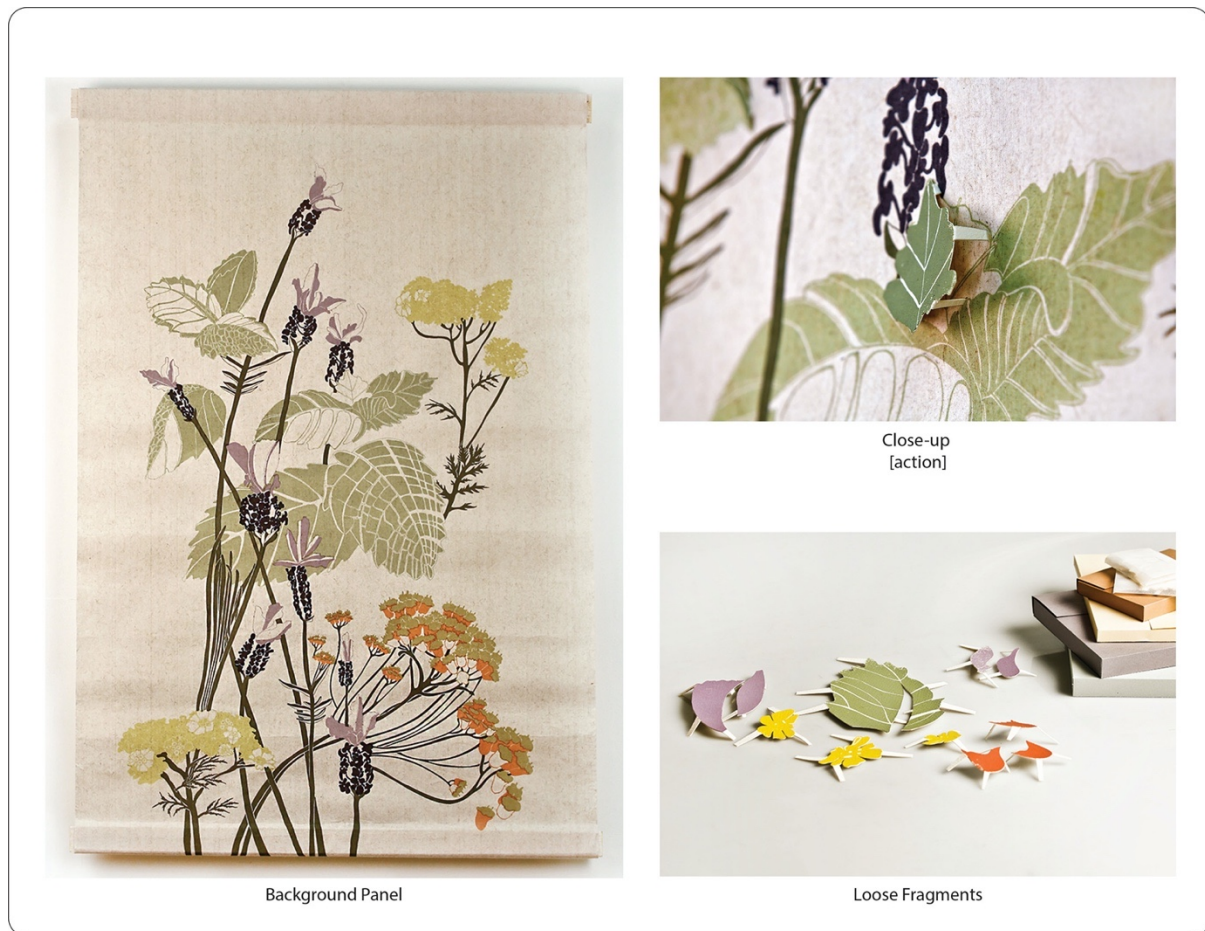


Figure 5:1 *Home Pharmacy*. Photographs by Cristina Schek.
 (for information about scale, materials, processes, and interaction please see Appendix C)
 (Brebeneel, 2020)

5.1.2. Reflection on *Home Pharmacy*

Reflection on *Home Pharmacy* took place soon after the artefact was completed, at the reflection-on-action level, but also on and off throughout the research process at the interpretative level.

As the artefact was completed it was publicly displayed at Apiary Studio as part of the *Surprise and Serendipity* exhibition which took place in London, UK in April 2015 (Figure 5:2). Having the artefact in this public exhibition offered the first opportunity for reflection. The display included the textile wall-hanging and two packages, one of them carrying inside the petal-shaped fragments of paper replicating the lavender petals infused with essential oil of lavender, and the other one having inside leaf-shaped fragments of paper replicating the peppermint leaves infused with essential oil of peppermint. While performing the interaction with the artefact and based on the set of questions received from the audience (questions about what the interaction consist of, how to interact with it, and its appearance) it was found that if the artefact is to be placed in someone's home, it will need to have written information that goes with it, mainly describing what is the way in which one can interact with the artefact and what is the artefact inspired by (i.e., nest behaviour). Upon conversation with the members of the audience, it was also revealed that different ways of

interacting with the work can be explored, for example by tying loose fragments to the wall-hanging, or by having the fragments already attached to the wall-hanging and then having to unravel them to release the oils.



Figure 5:2 *Home Pharmacy* as it was displayed at Apiary Studio

Soon after the exhibition followed a reflection on the shape *Home Pharmacy* took (a textile artefact made of a textile wall-hanging and loose fragments of paper), which considered the artefact against the nest behaviour of the blue tit with a focus on the type of interaction it involves, the imagery depicted on the artefact, and the materials and processes that were used in its making (Figure 5:3). The goal of this exercise was to shape a series of considerations for future practice for example: expand the library of interactions, with a focus on the use of simple strategies for interacting with the artefacts (similar to the interaction of the bird with the nest); explore with the imagery of the wall-hanging, and incorporate other ways to reference the nest environment as a way to strengthen future artefacts' connection to the biological model; and use a limited number of materials and processes that lead to the creation of an artefact that does not pollute the air in any way. This reflection also considered what engaging with an artefact that replicates the nest behaviour can do for the inhabitant, that is, what role it can play in the home environment. It was found that mirroring the bird's engagement with the nest in the inhabitant's engagement with the textile artefact, makes the inhabitant assume an active behaviour at home, it gives them the power to act upon its environment, and thus shape it.

	<i>Home Pharmacy</i>	Nest behaviour of the blue tit
Ways of adding/removing the fragments to/from the panel	In brainstorming about ways to have the fragments attached to the panel, I came up with various ideas, some of which involved using special materials (i.e., Velcro, magnets). However, this did not seem appropriate, which led me to realize that my interest lies in a low-tech interaction, that does not require special materials to function, similar to what the bird is performing. Considerations for future practice: continue using simple strategies (that require minimal actions) for adding/removing fragments to/from the wall-hanging.	Low-tech interaction (simple strategy for adding plant fragments in the nest)
Level of difficulty of the interaction	The interactions have a high level of difficulty because: there are many pieces, the shapes are very different, they are small and it can be hard to find where they belong on the panel. Due to its resemblance to a puzzle, it requires the participant's attention, which could stop the participant from noticing the bird story and allowing themselves to think about their behaviour as a reflection of the bird's behaviour. Considerations for future practice: design more spontaneous ways of placing the fragments and less intricate interactions.	Simple action of placing plant fragments into the nest
Imagery + Appearance	The imagery on the panel resembled a scientific illustration type of rendering, and it drew inspiration mostly from the visual qualities of the nest. Considerations for future practice: while keeping the reference to the nest environment, expand the visual vocabulary by creating various imageries; and integrate additional ways (i.e., tactile) apart from the visual ways to reference the nest environment.	Lavender (<i>Lavandula stoechas</i>), apple mint (<i>Mentha suaveolens</i>), daisy (<i>Helichrysum italicum</i>) and yarrow (<i>Achillea ligustica</i>) leaves and petals, moss, grass, and small twigs.
Materials	Non-woven linen, Arches paper, cotton, linen, water-based textile pigments. Considerations for future practice: use a limited number of materials and materials that have low environmental impact as a way to create an artefact that is not polluting.	Few materials Bio-degradable materials
Processes	Screen-print with photo-stencils. Printing in this way involves using chemicals (i.e., photo-emulsion) and large quantities of water in the process of creating the stencils and in the process of printing. Considerations for future practice: use textile printing processes that utilize less resources (i.e., digital print), and other textile process that use little resources as a way to create an artefact that is not polluting.	Low-tech making Little resources

Figure 5:3 Reflection on *Home Pharmacy* in relation to the nest behaviour of the blue tit

The interest in using imagery as a tool to strengthen future artefacts' connection to the biological model brought me to question and highlighted the type of inspiration that takes place in this research when inspiration from the nest behaviour of female blue tit bird is not only used to inform the behaviour of the artefact (i.e., its interactivity) but also its appearance (as the artefact mimics the aesthetic of the context in which the behaviour happens). I found that, in addition to the inspiration at the function level, through this research practice symbolic inspiration of the model is taking place. While functional inspiration implies replicating the behaviour of a model, symbolic inspiration means taking inspiration from the aesthetic of the model, as well as utilising elements that resemble the elements that are part of the model (help the model achieve its function). These

elements can be created by designers, or can be taken from nature (in which case, we can say they are a representation of the bio-utilisation concept). The purpose of the symbolic inspiration is to strengthen the connection to the model. Because of their nature of encoding meaning, the textiles created are seen as a tool in design communication. In this sense, the type of textiles developed fit into the category of 'communicative textiles' which according to Andrew (2008) communicate meaning through the use of specific imagery, the colours and texture utilised as well as the materials they that I used in their making.

Further reflection on the repetitive action of placing plant fragments into the nest led to considering the notion of ritual in the design of the interactions, as a way to assign ritual-like qualities to the interactions. The short literature review that follows was used as a guide during the design process, in addition to the bio-inspiration process. The main goal of this review was to identify how can one assign ritual-like qualities to an interaction and what would the function of such an interaction be.

5.1.3. Ritual theory

Ritual is defined by the Merriam-Webster (2016) dictionary as 'an act or series of acts regularly repeated in a set precise manner' and by Sorensen (2005, p. 42) as 'a type of action' during which 'ritual participants do something to something or someone'. The symbolic approach to ritual argues that ritual should be understood as an 'expressive behaviour that communicates certain meanings [...] coded in symbolic language' (Sorensen, 2005, p. 40). This is the ritual that is 'designed to stimulate reflection, for instance, by the use of deep symbols that require decoding and make people think' (Stausberg, 2006, p. 632). Moore & Myerhoff in their *Secular Ritual* book from 1977 also argue that rituals engage people in activities that stimulate reflection and awareness:

'In ritual, a bit of behaviour, an aspect of social life, a moment in time is selected, stopped, remarked upon [...] He is acting with awareness. He has taken the activity out of the ordinary flow of habit and routine and performed the gestures to arouse in himself a particular attitude, demonstrating that his actions mean more than they seem' (Moore & Myerhoff, 1977, p. 200).

The process of assigning an interaction (act/activity) ritual-like qualities is called ritualisation, or as Stephenson (2015, p. 76) describes it 'the cobbling together' of 'ordinary acts and gestures' that are turned 'extraordinary' and the 'process of stylization and formalization in which instrumental behaviour becomes symbolic and communicative' (Stephenson, 2015, p. 74). When discussing the ritualisation of domestic life Bell (1992, p. 74) defines it as 'a way of acting that is designed and orchestrated to distinguish and privilege what is being done in comparison to other, usually more quotidian, activities'. According to Stephenson (2015), the ritualisation of an action is accomplished through a variety of means, including, but not limited to: a) repeating the action, b) prescribing the steps, c) framing the action temporarily, and/or d) performing the action (with a special attitude).

In this research, the interactions acquire ritual-like qualities by being performed repeatedly, according to a prescribed set of actions, and for a particular amount of time. These type of interactions also have meaning, in that they encode the nest behaviour of the blue tit in symbolic

(aesthetic) language. The goal of assigning these qualities to the interactions was to make them more engaging, as people find meaning in interactions that have ritual-like qualities, because they go beyond fulfilling a technical function (Pasman and Lelie, 2003). Here, meaning comes in the form of the story of the blue tit female bird.

5.1.4. Conclusions

Home Pharmacy solidified the direction the practice took, which is designing bio-inspired textile artefacts that raise awareness by requiring interactions that have ritual-like qualities with the participants (as a reflection of the nest behaviour of female blue tit bird) during which essential oils will be released.

5.2. Design brief

The practice is centred around a design brief, informed by the contextual reviews in the previous chapters, and the reflection on *Home Pharmacy*. The design brief is providing a framework for practice.

The brief (Figure 5:4) is to explore ways to raise awareness about air quality at home through the designing and making of textiles samples and artefacts that are inspired by the nest behaviour of blue tit female bird.

Challenge - Air Quality at Home

Air quality at home is of major concern. At home we are constantly exposed to the effects of biological (e.g. fungi and bacteria) and chemical factors (e.g. VOCs) that have a great impact on our health. The biggest danger of air pollution at home is the exposure to the mixture of various biological and chemical factors. Most of designs on indoor air quality have been working on targetting a certain chemical or biological factors because there is no possible way to target the combined exposure.

Solution - Raising Awareness about Air Quality at Home

Raising awareness about the quality of air in the home environment has been identified as the appropriate strategy in dealing with the design challenge. Raising awareness about air quality is a pragmatic way that can work in preventing the generation of air pollution at home.

Strategy - Bio-inspiration + Textiles

The nest behaviour of the blue tit [*Cyanistes caeruleus*] female bird is the model for the textile design explorations because is a model of how nature maintains a healthy environment. The behaviour consists of female birds placing in their nests fragments of aromatic plants [e.g. lavender (*Lavandula stoechas*), yarrow (*Achillea ligustica*), daisy (*Helichrysum italicum*), and apple mint (*Mentha suaveolens*)] that are known for their antimicrobial characteristics, in order to protect their chicks against pathogenic bacteria [Ask Nature, 2014].



Blue tit [*Cyanistes caeruleus*]

Design Brief

Respond to the design challenge by creating a series of textile samples/artefacts that raise awareness about air quality at home and that are inspired by the nest behaviour of the blue tit female bird.

Considerations

Further consider why the behaviour of blue tit bird is an appropriate model for this challenge.
Analyse the model from a functional and conceptual point of view.
Have in mind the final outcome [i.e., a product, a set of directions, a kit, etc.]

Constraints

The work should not contribute to polluting the air at home in any way [i.e., use bio-degradable materials that do not release toxic chemicals, and processes that do not use much energy].
The samples should lend themselves to reproduction.
They should be appropriate for potential applications in their context [i.e., wallpaper].

Figure 5:4 Design brief

In the designing of the textile samples this is done through:

- Functional inspiration that is by applying steps 4, 5 and 6 of the bio-inspired textile design process, which involve: (4) observing the nest behaviour of the blue tit to see how it functions and formulating the biological principle; (5) abstracting the nest behaviour of the blue tit by turning the biological principle into the design principle; and (6) imitating the nest behaviour of the blue tit by identifying ways in which the abstracted nest behaviour of the blue tit can be imitated in the design of sketches and textile samples.
- Assigning ritual-like qualities to the interactions.
- Symbolic inspiration, that is taking inspiration from the aesthetic of the nest behaviour of the blue tit.

In the making of the textile samples, this is done by:

- Experimenting with textile materials and processes (that is translating the design principle into textile samples and artefacts).

5.3. Overview of textile practice

Once the design brief was established, three sets of small-scale samples were created, each set exploring different ways of adding/removing loose fragments to/from a background panel. During this step, the focus was not on how they would be further integrated into the design of large-scale artefacts. Instead, the focus was on developing a tactile library of material interactions. Following the design of the small-scale samples, six medium-scale samples were generated, exploring how the interactions previously created would be rendered at a larger scale, and how they would be integrated compositionally in the design of large-scale artefacts. These samples were seen as possible mock-ups of the large-scale artefacts. After all the samples were created, two artefacts (e.g. *Remedial Landscape* and *Nest Engagement*) were created, that together with *Home Pharmacy* were tested during the first adoption experiment. Informed by the results of the first adoption experiment, five other artefacts were created, that together with *Nest Engagement* were tested during the second adoption experiment. This research ended with the creation of *Bio-inspired Awareness*, a textile artefact which integrates the design guidelines for bio-inspired design that raises awareness about air quality. An overview of the practice developed in this research can be seen in Figure 5:5.





















Large-Scale Artefact	Small-Scale Samples	Medium-Scale Samples	Large-Scale Artefacts for AE1	Large-Scale Artefacts for AE2	Final Large-Scale Artefact
 <p>Home Pharmacy</p>	Set no.1 [11 samples] 	Sample 1.1  Sample 1.2 	<i>Home Pharmacy</i> [Artefact 1.1] 	Artefact 2.1  Artefact 2.2 	<i>Bio-inspired Awareness</i> 
	Set no. 2 [10 samples] 	Sample 2.1  Sample 2.2 	<i>Remedial Landscape</i> [Artefact 1.2] 	Artefact 2.3  Artefact 2.4 	
	Set no. 3 [5 samples] 	Sample 3.1  Sample 3.2 	<i>Nest Engagement</i> [Artefact 1.3] 	Artefact 2.5  Artefact 2.6/1.3 	

Figure 5:5 Overview of textile practice

5.4. Designing the textile samples

In designing the textile samples the bio-inspired textile design framework was followed which involved taking inspiration from the biological model at the function level, assigning ritual-like qualities to the interactions, and taking inspiration from the biological model at the symbolic level.

5.4.1. Functional inspiration taken from the nest behaviour of blue tit female bird

The process of designing started with taking inspiration from the biological model at the function level, which involved applying the steps 4, 5, and 6 of the bio-inspired textile design process as seen below.

Step 4 involved an analysis of the nest behaviour of the blue tit which led to identifying the biological principle that inspires the design of the artefacts. The biological principle is what organisms use to accomplish a function (HOK, 2013). Here, the biological principle is *blue tit female birds place aromatic plants with antimicrobial characteristics in their nests in order to protect their chicks against pathogenic bacteria and parasites*.

Step 5 involved describing the biological principle without using biological terms (i.e., abstracting the nest behaviour of the blue tit) in order to form the design principle. Here, the design principle is *inhabitants actively interact with their homes (i.e., nests) by placing external elements (i.e., aromatic plants) in the home that have health-beneficial properties*.

Step 6, the process of translating the design principle into samples, started with identifying ways in which the action of the bird placing plant fragments in the nest could be translated into actions that could be replicated by the participants. As a result, a list of verbs that would represent how loose fragments could be *added* to the background panel was generated. This included verbs such as to place, to attach, to attract, to connect. Because this is an exploratory exercise a list of antonym verbs to the ones previously created was also generated, therefore imagining ways in which loose fragments could be *removed* from the background panel. This includes verbs such as to take, to detach, to repel, to disconnect. The exercise continued with examining ‘how can these actions be translated into textile artefacts?’ As a result, a series of strategies for achieving these actions were identified. The strategies were informed by textile techniques, such as stitching, tying, crocheting, weaving, or folding. The translation of actions into textiles techniques mirrored the previous process about generating the list of verbs, therefore the pairs created were: stitch >> unstitch, crochet >> unravel crochet, weave>>unravel weave, and fold >> unfold, and knot >> undo knot (Figure 5:6). The results of this translation were 46 samples exploring ways in which loose fragments of fabric and/or paper could be added to /removed from a background panel while utilising the textile techniques mentioned above (Figure 5:7).

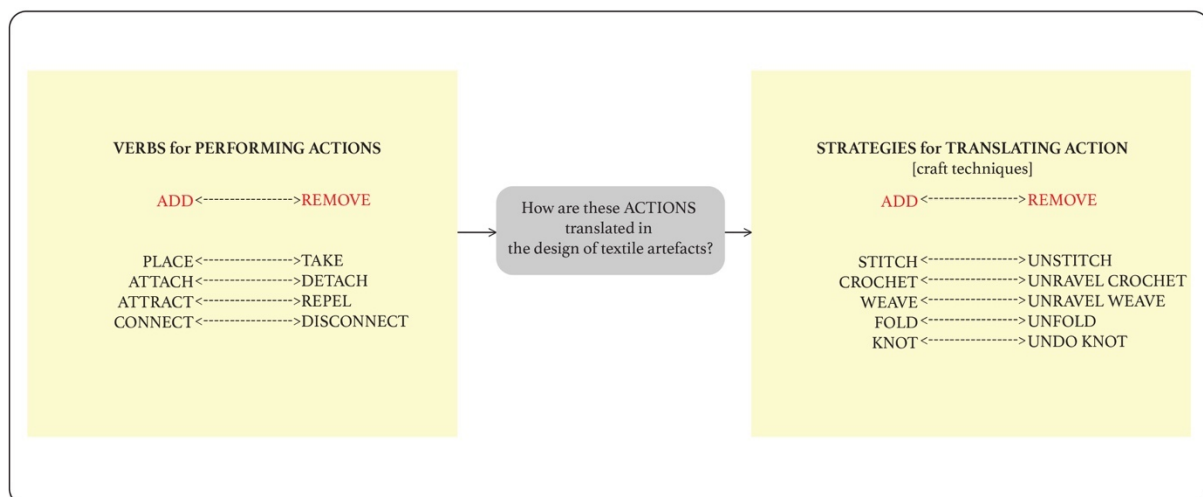


Figure 5:6 Translation of design principle into design work
(Brebene, 2020)



Figure 5:7 The 46 samples that represent the translation of design principle into design work

5.4.2. Ritualizing the interactions

The design process also involved assigning ritual-like qualities to the interactions inspired by the nest behaviour of the blue tit female bird. This was achieved by designing: interactions that happen repeatedly, interactions that happen for a certain amount of time, interactions that happen according to a prescribed set of actions, and interactions that have meaning.

To design interactions that happen repeatedly, each sample was provided with several loose fragments that participants could add to/remove from the background panel. The number of fragments varied from sample to sample. This number did not however decide how many times the interaction was repeated, as participants had the freedom to add to/remove from the background panel however many fragments they wish.

To design interactions that happen for a certain amount of time, timing in regard to the individual activity was explored. This involved investigating how long it takes to unstitch a fragment using a needle as opposed to unravel crochet by pulling a thread, and then creating samples that incorporate subtle, short interactions (i.e., placing a fragment in a pocket) or dramatic, long interactions (i.e., unstitch a fragment using a needle).

To design interactions that happen according to a prescribed set of actions, the participants were given directions on how to interact with the artefacts. In these directions, no reference to a repetitive way of interacting with the artefact was made, the information provided was limited to describing what the interaction entailed (i.e., place the loose fragments on the panel by attaching them to the threads on the panel). The participants had the freedom to interact with the artefacts at whatever time they wish, whenever they wish, and for however long.

The interactions designed have meaning, as they are a replica of the nest behaviour of the blue tit. This is communicated symbolically through the type of interactions incorporated in the design of practice, and communicated literally in the form of a story of the nest behaviour of the blue tit which the interactions replicate. Here, the story of the nest behaviour is printed on a piece of paper and then packaged with the artefact (Figure 5:8). In this thesis, it is argued that it is important for the participants to know about the inspiration behind the artefact as this could make them have an understanding of their behaviour as the equivalent of the bird behaviour, and their home as the equivalent of the nest, which could lead to awareness about their home and its health.

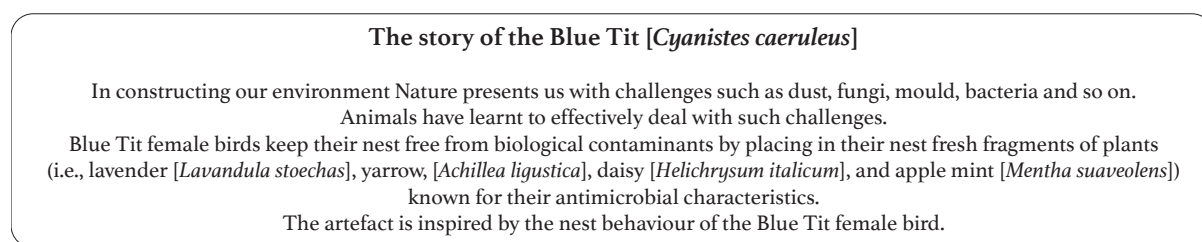


Figure 5:8 The story of the nest behaviour of the blue tit as included in the adoption package

5.4.3. Symbolic inspiration taken from the nest behaviour of blue tit female bird

Last, the process of designing the samples also involved taking inspiration from the biological model at the symbolic level. This was informed by an analysis of the nest behaviour of the blue tit from a symbolic point of view. In this research, the link to the nest behaviour of the blue tit is not practical but conceptual. While the bird performs the behaviour with a practical goal (i.e., creating a healthier environment for the eggs and the chicks, that is free from ectoparasites), the participants' engagement in this type of behaviour has a different purpose. The goal is not to make the environment healthier but to design a type of behaviour that triggers awareness about the health of the domestic space (by promoting and replicating a model that actively participates in the maintenance of a healthy environment). Therefore, it is important to strengthen in the participants' minds the connection between the nest behaviour of the blue tit and the participant's behaviour. This is achieved by several means.

First, by imagining the home as a metaphor for the nest. This is achieved by emphasizing the aesthetic qualities of the textile samples and artefacts, through the use of colours, shapes, textures, the use of particular imagery, and of materials utilised. The colour scheme is characterized by earth tones inspired by the nest and the depicted plants. The imagery is inspired by the natural environment of the bird and the plants that the bird brings into its nest. Thus, it incorporates botanical forms, such as buds, foliage, and petals. The imagery is covering a wide range of interpretations of floral motifs, from a more scientific type of rendering to others that are more abstract. The choice of materials, also influenced by the nest environment, includes materials with qualities that resemble the environment, such as raffia fibre, and fabric made of pineapple fibre or banana fibre whose open weave resembles that of the nest. These materials allow samples to acquire features such as softness and warmth, which are also qualities of the bird environment. Through the botanical imagery depicted on the artefacts, and the textures utilised as a way to contribute to the creation of an environment that resembles natural environments the practice

incorporates the principles of organic design. As mentioned earlier in this thesis, organic design is one of the dimensions of biophilic design that involves incorporating in the design of the buildings things like natural lighting and ventilation, shapes, and forms that directly, indirectly, or symbolically remind people of natural elements.

Second, by incorporating in the design of samples fragments infused with essential oils that replicate the fragments of aromatic plants the bird is bringing into its nest. The blue tit incorporates fragments of lavender (*Lavandula stoechas*), apple mint (*Mentha suaveolens*), daisy (*Helichrysum italicum*), and yarrow (*Achillea ligustica*) in its nest. The artefacts in this research only utilise lavender essential oil from *Lavandula officinalis* and peppermint essential oil from *Mentha piperita*. This is because people are familiar with these two oils. The idea of using essential oils (or plant material) in the home is far from being new. A few products that do so are the fuming pot⁵⁷ dating from the 16th – 17th century, Papier D'Armenie⁵⁸ which has been on the market for about 130 years, and more recently, Herbal Textiles⁵⁹ by Alexandra Stueck. The fuming pot of green and yellow glaze (Museum of London, 2017) held aromatic herbs and spices which, when warmed by lighted charcoal, wafted pleasant smells around the room. In addition, the object was used to fumigate rooms in order to repel pests, such as mice and fleas, and to neutralize 'sick' air, as aromatic herbs such as meadowsweet were used to counteract domestic odours. Papier D'Armenie (Papier D'Armenie, 2017) is indoor fragrance that comes in the form of paper for burning. The product improves air quality by releasing benzoin through burning of the paper (since benzoin is known for its anti-septic properties). Also, it has a positive effect on the psyche and emotions which makes it popular with those feeling stressed. Herbal Textiles (Stueck, 2017) are infused with herbal scents. Stueck worked with five scents that are claimed to have certain health benefits. The scents are released by body warmth, touch or movement whenever the fabric is used. All these products use oils with a very clear purpose: to make use of the beneficial properties essential oils are well-known for (Raut & Karuppayil, 2014; Adorjan & Buchbauer, 2010). The oils incorporated in the design of artefacts (e.g. lavender and peppermint) are known to have antibacterial, antifungal, anticancer, antiviral, antidiabetic, antioxidant, anti-mutagenic, and anti-inflammatory properties (Raut & Karuppayil, 2014). However, in the context of this research, the oils are used as triggers for awareness, due to their association with health. The work does not claim to be making the air in the home environment healthier through the use of essential oils.

5.5. Making the textile samples

5.5.1. Drawing

Drawing is an important tool in this practice as it allows to brainstorm about ideas and clarify these ideas. Drawing also allows to quickly experiment with visual elements such as colour and shape, and

⁵⁷ The fuming pot. Available from: <http://www.museumoflondonimages.com/image_details.php?image_id=65587>.

⁵⁸ Papier D'Armenie. Available from: <<http://www.papierdarmenie/fr/shop/en/>>.

⁵⁹ Herbal Textiles. Available from: <<http://alexandrastueck.com/HERBAL-TEXTILES>>.

to plan the layout for the samples. Figure 5:9 includes graphite and colour pencil drawings that have complemented the research process.



Figure 5:9 Pages with drawings from the resource notebook

5.5.2. Textile materials

An array of textile materials is used to make the samples and artefacts (Figure 5:10). The majority are made of 100% natural fibres. They include well-known fabrics and papers (e.g. unbleached cotton, Belgian linen, silk gauze, and Arches paper), and specialty materials (e.g. non-woven linen, fabrics made of banana fibre or pineapple fibre, and handmade recycled paper). Throughout, a mixed-media approach (i.e., the utilisation of a variety of materials such as fabrics, paper, or thread) is emphasized.



Figure 5:10 Pages with material swatches from the resource notebook
(Brebenel, 2020)

Allen (2014) argues designers chose materials based on their performance qualities, the designer's taste (aesthetic), the designer's awareness of environmental concerns, and the designer's 'cultural heritage and associations of materials with our sense of history and place' (Allen, 2014, p. 63). In this research, the choice of materials is influenced by 'what they do and what happens when you work with them' (Ingold, 2013), their physical properties (i.e., weight, transparency and opacity, flexibility); by their visual and tactile qualities; and by an awareness of environmental concerns. For example, because the design of artefacts includes fragments that are impregnated with essential oils that need to be contained until the participants interact with them, pergament paper is utilised to create the enclosure for the loose fragments. This is because pergament paper has a well-sealed surface that does not allow for air to pass, thus is able to trap the scent inside. In addition, the paper is translucent which gives the participant a sense of what is inside. Regarding the visual and tactile qualities, these are informed by the nest environment of the blue tit. Last, the choice of materials is also influenced by the principle of integration of natural materials, the concept of bio-utilisation, and by how materials affect the environment. In that sense, conscientious choices of using environmentally-neutral materials (i.e., materials that do not pollute the air of the home in which the artefact is placed) are made, and as a result, a limited number of materials and processes are utilised as a way to create an artefact that is not harmful to the environment while being produced, while being used, and once discarded. For example, even though the first samples were screen-printed, soon after digital printing was used, because it requires less dyestuff per metre than screen-printing (Briggs-Goode & Russell, 2011), and because it allows to print at any scale detailed designs

that use a myriad of colours, which otherwise would require many resources if they were screen-printed.

5.5.3. Textile processes

The making of samples involves a combination of hand-made processes, mostly screen printing⁶⁰, stitch, crochet, and digital processes, such as transfer printing⁶¹ and digital printing⁶². Even though there is a mix of hand techniques and digital processes, throughout, hand-making is used as a predominant mode of production.

The making, except for printing processes, took place in my home studio in London, UK, and in Halifax, Canada. The hand printing with silkscreens on fabric and paper took place in the Textile Print studio at Central Saint Martins, in London, UK, and the Textiles Dye and Print studio at NSCAD University, in Halifax, Canada. The designs for the digital prints were created using Adobe Photoshop CS6 software. The transfer printing took place in the Textile Print studio at Central Saint Martins, and the inkjet printing took place at MoreTextile Group in Guimaraes, Portugal.

In this research, there are processes used in the making of the samples and processes used in the design of interactions. Processes involved in both categories are specific to the making of textiles. However, if the processes involved in the making of artefacts are meticulous, and tend to be time-consuming, the processes that participants engage with require much less involvement and therefore shorter interaction time. These latter processes consist of familiar, simple actions such as unfolding, knotting, unravelling.

5.5.4. Reflection on making

A ritual is built in the process of making. Just as the artefacts invite the participants to engage in ritualistic interactions, the set up (Figure 5:11) in which the making is taking place is very specific. It is comprised of materials and tools that encourage to engage in a ritualistic kind of activity. The engagement in this activity is not simply limited to the physical act of making, it also represents a

⁶⁰ In screen printing 'a mesh is stretched over a frame. Areas to print are left open; the negative parts are blocked. The screen is then placed onto the fabric; when dyestuff is pulled over it with a rubber blade (squeegee), the colour passes through the open areas, transferring the colour to the cloth' (Briggs-Goode & Russell, 2011, p. 106).

⁶¹ In transfer printing 'the design is printed onto paper and transferred from this onto cloth' (Briggs-Goode & Russell, 2011, p. 108). The most common method uses sublimation paper and disperse dyes. 'The sublimation process describes a process of taking a solid to a gas and turning it into a solid again. [...] After the paper is printed with the design, it is then pressed onto the fabric with heather rollers which transfer the dyestuff onto the fabric' (Briggs-Goode & Russell, 2011, p. 108).

⁶² 'Digital printing is essentially an inkjet process. A series of print heads pass back and forth across the fabric, spraying dyestuff onto it. The print head is supplied by a range of colours normally based around cyan, magenta, yellow and black, the optical mixing of which, when printed, gives rise to a full spectrum of colours' (Briggs-Goode & Russell, 2011, p. 106).

time for reflection. Because of the nature of the activity performed (i.e., stitching row by row), the time spent making, allows for reflection on the work created as a way to understand it better.



Figure 5:11 The making environment

The ritual of making is characterized by repetition, but the repetition in this ritual is never ‘the simple continuance of self-identical’ synonymous with lifelessness, but is rather an engagement with ‘a tradition replete with potential, modification and innovation’ (Casey, 2000 cited in Carlin, 2015, p.85). The repetitions within the making take place at different levels, as follows: there is the repetition of the idea, the continuous reiteration of a process, and the repetition of an action that is part of the process. Figure 5:12 illustrates one of the textile processes (e.g. crochet) used repeatedly in the making of the loose fragments for *Nest Engagement*. Every time an idea, a process, or an action is repeated, a slightly different version of the previous sample is created, different in that the idea behind it might have evolved, or the process was altered, all as a result of a reflection on the samples created previously. Therefore there are subtle variations among the samples that explore the same idea, work with the same process, or perform the same action.

This way of working emphasises a poetic and mindful way of developing textiles, that is opposed to the high-tech engineering approach which characterises the practice of design that addresses air quality at home. In this way of working, the focus is on the engagement with materials in the creation of artefacts that are a reflection of the functional and symbolic inspiration taken from the behaviour of the blue tit female bird. The engagement, which involves working with low-tech time consuming textile processes, led to the development of particular type of interactions, ones that

mirror the processes utilised in their making, thus are slow and emphasise the tactile and the visual qualities of the artefacts, as well as their olfactory qualities.



Figure 5:12 Making of the loose fragments for *Nest Engagement*

5.6. Overview and analysis of textile samples

The physical textile samples, as data, demonstrated the design concepts discussed previously and provided a starting point for the development of textile artefacts. They also offered the opportunity for an analysis of practice in terms of production possibilities, with regards to the materials and techniques utilised. The textile samples included three sets of small-scale samples (comprised of a total of 46 samples) and six medium-scale samples.

5.6.1. The small-scale samples

The 46 small-scale samples developed are a representation of the functional inspiration which includes the ritualization process, and the symbolic inspiration of the nest behaviour of blue tit female bird.

The samples involved interactions for adding fragments to the panel and interactions for removing fragments from the panel. Fragments were added to the panel by either placing them on, or attaching them to the panel, and removed from the panel by detaching them. For adding fragments to the panel by *placing* them, I created pockets in which the fragments could be placed, I cut slits into the panel where fragments could be inserted, and I created loose weavings where fragments could be inserted. For adding fragments to the panel by *attaching* them, I provided the fragments with threads that could be used to tie them to the panel, and for removing fragments from the panel by *detaching* them I unstitched or unraveled crochet fragments.

According to the type of materials and techniques I used to create the interaction, I organised the samples into three sets (Figure 5:13). This organisation allowed me to analyse them in terms of how they are produced. It also allowed me to identify patterns in the making of samples so that when it came to designing the textile artefacts there was a range of interactions explored. For the samples in set no.1, I focused on the design of the panel, on constructed surfaces that incorporated deep

pockets in which fragments could be fully inserted or shallow pockets which served to hold the fragment in place, or the creation of open weaves which allowed for fragments to be added by ‘weaving’ them in. For the samples in set no.2, the emphasis was on the use of thread which was either used to tie the fragments to the panel or to stitch the fragments to the panel that then needed to be unstitched in order to remove the fragment from the panel. For the samples in set no.3, I worked with the crochet technique. In these samples, participants were required to remove fragments from the panel by unravelling the crochet. When choosing the materials used in these samples I took into consideration transparency (because I wanted the fragments that were either inside pockets or encapsulated in between two pieces of transparent paper to be seen), lightness, colour, and texture as features of the bird’s nest.




Set No.	Action	Strategy	Process [how it is done]	
1.	Adding	by placing fabric/paper fragments into pockets	by creating pockets (out of transparent materials) where fragments can be placed.	
		by placing fabric/paper fragments onto structured surfaces	by creating structured surfaces as a background (i.e., loose weavings, background that has cuts) where fragments can be inserted.	
2.	Adding	by tying fragments to the background	by attaching threads to the fragments, so that they can be used to tie the fragments to the threads on the background.	
	Removing	by unstitching fragments	by unstitching the fragments enclosed between layers of paper that are stitched to the background.	
3.	Removing	by unravelling crochet	by unravelling the crochet that holds together the fragments enclosed between layers of paper and that are stitched to the background.	

Figure 5:13 Overview of interactions in the three sets of small-scale samples
(for more information [i.e., scale, materials, processes, interaction] about each sample please see
Appendix A, Appendix E and Appendix I)

The main goal of making these samples was to create a library of material interactions to be used as a starting point for the development of artefacts. At this stage, I did not base my choice of materials

solely on their suitability for the interactions designed, but also considered their aesthetic, since the aesthetic plays a conceptual role in the practice developed.

In the process of generating the samples the criteria for what makes a sample successful involved having it being interactive in a ritualistic manner, and having it reflect the aesthetic of the natural world, in the imagery, colour, and texture it utilises. No evaluation took place through the process of making, as this was an exercise whose main goal was to generate as large of a number of samples I could until I reached the point I considered there is enough information that I could draw from to generate the textile artefacts.

The main limitation of this exercise was that due to their small-scale, I could not explore with composition in the design of the samples (composition which is guided by the interaction a piece incorporates), therefore it was hard to imagine the final shape the artefacts would take. As a result, I decided to create medium-scale samples which would allow me to experiment with composition, and create a vision for the textile artefacts.

5.6.2. The medium-scale samples

Two medium-scale samples emerged from each set of small-scale samples. The medium-scale samples are intermediary works making the transition from the small-scale samples to the textile artefacts. Their main goal was to allow the creation of more elaborate compositions, meaning pursuing deeper exploration with visual elements of line, shape, colour, texture, and pattern. In this sense, I thought of them as mock-ups of the textile artefacts. They are larger than the previous samples, nevertheless, they are still called 'samples' which means they are seen as exploratory exercises, and not finished work. This exercise also allowed me to gather further insight into how the interactions inform the choice of materials, which together with the knowledge previously acquired, can inform the design of textile artefacts. Because the focus was on evolving the small-scale samples into more resolved composition, there are no new interactions created in these samples, that is, all interactions utilised are replicating interactions that exist in the small-scale samples. In regard to the development of the compositions, the way I approached this exercise was by putting together aesthetic information from one or more small-scale samples in the design of a piece, and evolving that information through further play with colour, pattern, texture, and line.

In the samples for set no. 1 (Figure 5:14) I explored with stylised yet realistic imagery, with both samples including representations of the four plants in shape and colour, as a way to create a visual connection to the biological model. The samples utilised the pockets strategy, therefore I experimented with the idea of a double-sided textile which has imagery on one side and pockets on the other, and the idea of an open-weave textile as a way to allow for the air to circulate thus spreading the scent of the essential oils in the home. This led me to use lightweight and open weave fabrics (e.g. fabric made of pineapple fibre and cotton gauze) for the background panel and the pockets. In sample 1.2 I also used Japanese paper that has been cut to allow for air circulation.

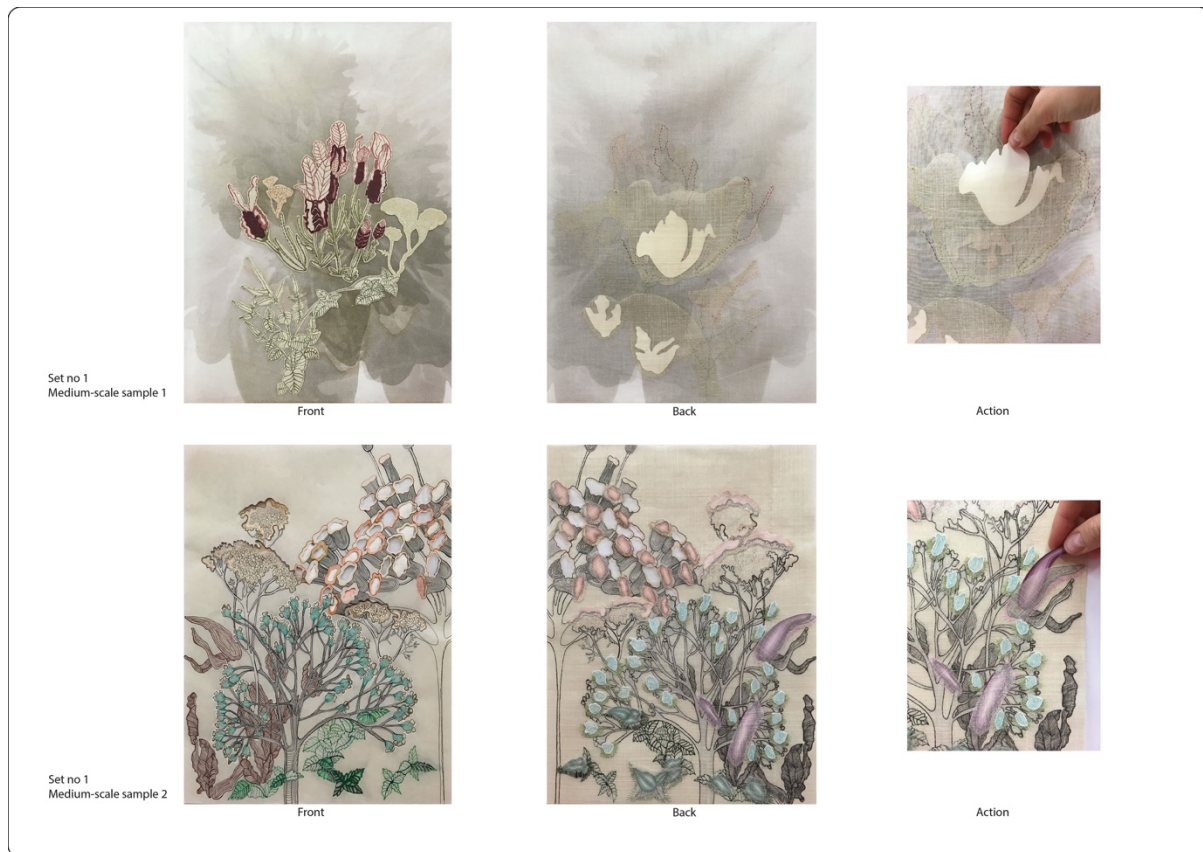


Figure 5:14 Medium-scale samples for set no. 1 (for more information [i.e., scale, materials, processes, interaction] about these samples please see Appendix B)

The samples for set no. 2 (Figure 5:15) use more abstract imagery, and the reference to the biological model is more subtle. As opposed to the previous samples where the focus was on creating one of a kind compositions, here the focus is on the design of a surface made out of repeated patterns. In terms of interactions, the samples explore two different strategies. Sample 2.1 uses the tying strategy to add fragments to the panel. Sample 2.2 uses the unstitch strategy to remove fragments from the panel. Because fragments impregnated with essential oils for both samples were encapsulated as a way to contain the scent and had to be opened up for the scent to be released, I experimented with the layering of materials as a way to encapsulate the fragments, and I considered not only the visual but also the physical qualities of the materials. As a result, I decided to use pergaminata paper because of its transparent, but also waxy surface that seals the scent inside.



Figure 5:15 Medium-scale samples for set no. 2 (for more information [i.e., scale, materials, processes, interaction] about these samples please see Appendix F)

In designing the samples for set no. 3 (Figure 5:16), I returned to using more realistic imagery. Out of the six samples, these two are the ones that took the inspiration from the biological model most literally. The design is inspired by the aesthetic of the nest, with its circular structure, and the twigs and the plant fragments which are a part of it. In terms of strategy, these samples explore the unravel crochet strategy. They are made using the same imagery but printed on different materials (sample 3.1 is on Belgian linen, while sample 3.2 is on Japanese paper). I printed the same imagery on different backgrounds because I was aiming to find the most appropriate background for the fine line print. While the texture and the heavyweight linen seemed to overwhelm the fine line print and the texture created by the crochet, the smooth texture of the paper seemed more appropriate.



Figure 5:16 Medium-scale samples for set no. 3 (for more information [i.e., scale, materials, processes, interaction] about these samples please see Appendix J)

Through the making of small-scale and medium-scale samples, I was able to identify the type of materials, the type of techniques, the type of interactions, and the type of compositions that will inform the design of textile artefacts.

5.7. Summary of *Design practice: Home Pharmacy and textile research*

This chapter included a description and analysis of *Home Pharmacy*, the formulation of the design brief, an illustration of what the designing and the making of textile samples involved, and an overview and discussion of the textile samples created.

The chapter started with a discussion on *Home Pharmacy*, which functioned as a proof of concept and helped shape the design brief. *Home Pharmacy* was a way to give physical shape to the nest behaviour of the blue tit female bird, through the design of a textile artefact for the home environment. The purpose was to make the biological information less abstract and have it translated into a tangible object that can function as a starting point for the analysis of the concepts put forward in the contextual reviews and their practical implementation. In addition to establishing the procedure for the designing and making of upcoming practice, and a series of considerations for this practice (e.g. take into consideration the environmental impact of materials and processes used, expand the library of interactions, etc.), the reflection on *Home Pharmacy* also highlighted the role that the interactions created as a result of the biological inspiration can play if assigned ritual-like

qualities. The short literature review on ritual established how one can design interactions that have these type of qualities and what role they can play for the participants. These findings together with the contextual reviews in the second and third chapter informed the design brief that functioned as a tool that guided the textile research. The design process of the samples involved taking inspiration from the function of the biological model (which included the formulation of the biological principle, then of the design principle, followed by the translation of the design principle into 46 physical interactive textile samples); assigning ritual-like qualities to the interactions (which involved the development of strategies for designing interactions that happen repeatedly, interactions that happen according to a prescribed set of rules, and interactions that have meaning); and taking symbolic inspiration from the biological model. The main purpose of taking inspiration from the model at the symbolic level was to strengthen in the participant's mind the connection to the model. In that sense, the design of artefacts incorporated essential oils, and the home was imagined as a metaphor for the nest. The making of samples emphasized an intuitive way of making in which discoveries were occurring in the process of making, a process that involved engagement with textile materials and processes as well as fine art materials and processes, and took into consideration the materials and processes used as a way to create work that is not harmful to the environment while being produced, while being used, and once discarded, and most importantly that does not pollute the air in any way. The chapter ended with a presentation of the 46 small-scale samples and the six medium-scale samples developed, that incorporated the guidelines for designing mentioned above, and a discussion on the role the samples play in this research, which consists of creating a library of material interactions, and compositions that can inform the design of the interactions and the aesthetic of the textile artefacts discussed in the next chapter.

The goal of this chapter was to establish the procedure for designing and making bio-inspired textile artefacts that raise awareness about the health of the home environment with a focus on air quality, artefacts which are discussed in the next chapter, together with their evaluation through two adoption experiments.

6. Evaluation of textile practice

6.1. The first adoption experiment

The first adoption experiment took place in London, UK in August-September 2017 and involved three participants, each having a textile artefact in their home for two weeks, time during which they were invited to install the artefact, engage with it, record their engagement in the journal provided, and take one photograph of the artefact while installed in the home. The aim was to identify if the engagement with the artefacts could raise participants' awareness about the home environment with a focus on air quality. This adoption experiment worked as a trial, so in addition to testing if the interaction with the artefacts could raise awareness about air quality, it also tested the format of the adoption method and its application. Because it was a trial, it had a small number of participants.

6.1.1. Textile artefacts for the first adoption experiment: *Home Pharmacy*, *Remedial Landscape*, and *Nest Engagement*

Three textile artefacts (Figure 6:1) were evaluated during the first adoption experiment: *Home Pharmacy*, *Remedial Landscape*, and *Nest Engagement*.

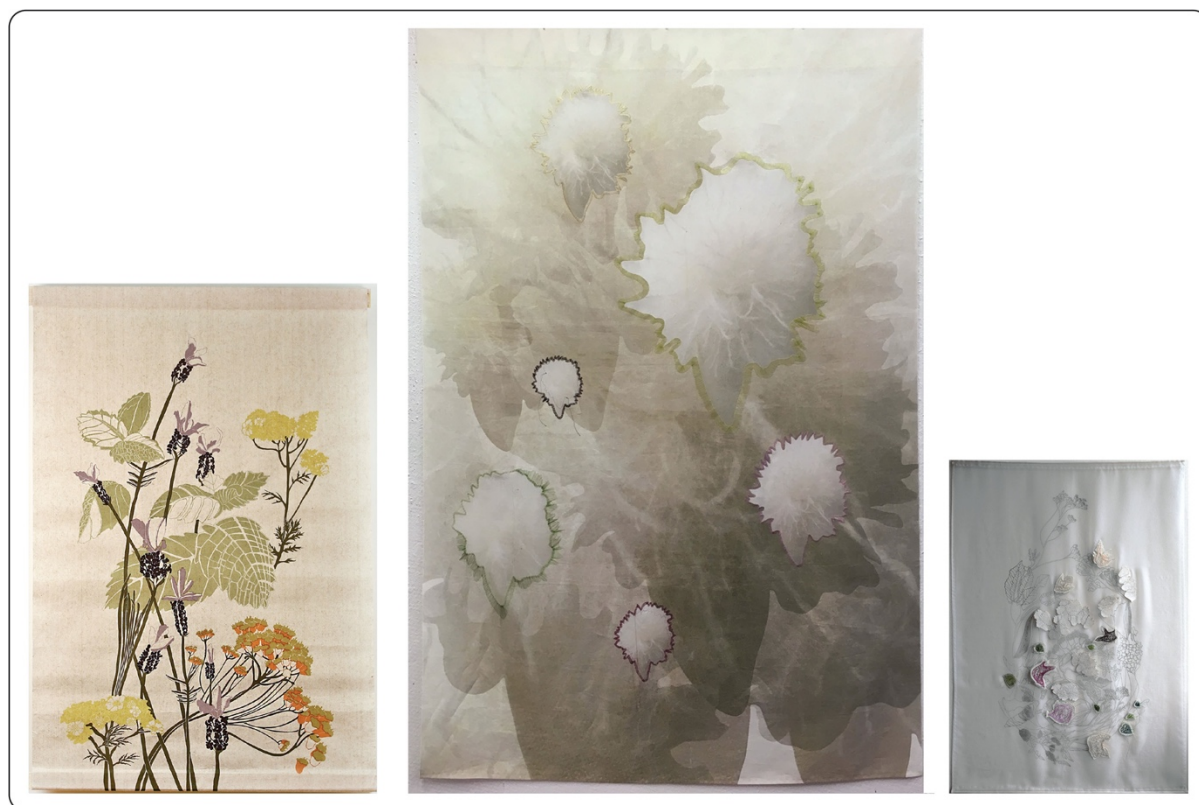


Figure 6:1 The three research artefacts (*Home Pharmacy*, *Remedial Landscape*, and *Nest Engagement*) evaluated during the first adoption experiment

The artefacts incorporated the procedure for designing and making established in the previous chapter. In that sense, they are taking inspiration from the function of the nest behaviour of the blue tit since (1) they incorporate interactions that are a replica of the nest behaviour of the blue tit (e.g.

they involve adding or removing fragments from the textile wall-hanging), and interactions that have ritual-like qualities as a reflection of the bird's interaction with its nest; and (2) they communicate the story of the blue tit to the participants through the use of a print out that describes the nest behaviour and is included with the artefact. The artefacts are also taking inspiration at the symbolic level in that their aesthetic is inspired by the aesthetic of the biological model, and they incorporate essential oils in their design as replicas of the fragments of aromatic plants the bird is bringing into its nest. Lastly, they take into consideration the materials and processes utilised in the making of these artefacts.

The interactions each of the three artefacts included were informed by the interactions in the textile samples, and the choice of materials and processes was informed by the material experimentations in the textile samples. As a result, each artefact explored a different strategy for interaction and utilised the materials and processes that work best for that interaction, as follows.

Home Pharmacy is based on the medium-scale samples for set no. 1 and uses the strategy of placing and attaching fragments to the wall-hanging by providing the fragments with legs that can slide through the fabric and bend at the back thus staying attached. The textile wall-hanging for *Home Pharmacy* is made of non-woven linen screen-printed by hand using textile pigments. The non-woven linen was used because it does not fray, in that sense, it behaves like paper, therefore it was most suitable for this design proposal.

Remedial Landscape (Figure 6:2) is based on the medium-scale samples for set no. 2 and uses a strategy for adding the fragments to the wall-hanging (which involves tying them to the wall-hanging), as well as a strategy for releasing the scent (which involves unravelling crochet and unstitching of the loose fragments). As a result, the participant is invited to first open up the fragments in order to release the scent, and then to attach the fragments to the wall-hanging. The textile wall-hanging for *Remedial Landscape* is made of digitally printed heavyweight linen embroidered with cotton gauze which allows the air to pass through thus spreading the scent throughout the room. The loose fragments, made out of digitally printed cotton gauze and non-woven linen, are enclosed in between two layers of pergamena paper in order to seal the scent until they are interacted with.



Figure 6:2 *Remedial Landscape*

(for information about scale, materials, processes, and interaction please see Appendix G)

Nest Engagement (Figure 6:3) is based on the medium-scale samples for set no.3 and uses the strategy of unravelling crochet. Flower-shaped and leaf-shaped fragments of non-woven linen impregnated with essential oils are stitched onto the wall-hanging. These fragments are then enclosed between two pieces of pergamenata paper that are crocheted together. The participant is invited to unravel the crochet in order to expose the fragments of non-woven linen impregnated with essential oils. The wall-hanging for *Nest Engagement* is made of silk gauze screen-printed by hand using textile pigments in order to allow for the air to pass through once the fragments are unravelled and the scent is released.



Figure 6:3 *Nest Engagement*

(for information about scale, materials, processes, and interaction please see Appendix K)

Because this adoption experiment worked as a trial, one of its goals was to identify what scale should the artefact have to be easy to accommodate in the home. As a result, I experimented with three scales, with *Nest Engagement* being the smallest measuring 60 cm by 85 cm, *Home Pharmacy* measuring 90 cm by 130 cm, and *Remedial Landscape* being the largest measuring 135 cm by 195 cm. Additionally, because the textile artefacts were given for adoption, the design process for the three artefacts did not only include the design of interactions, the design of imagery and consideration of scale, but also the design of the installation system, of the packaging, and most important considerations of the information participants would need in order to engage with the artefacts. As a result, the textile artefacts were given to the participants as adoption packages (Figure 6:4).

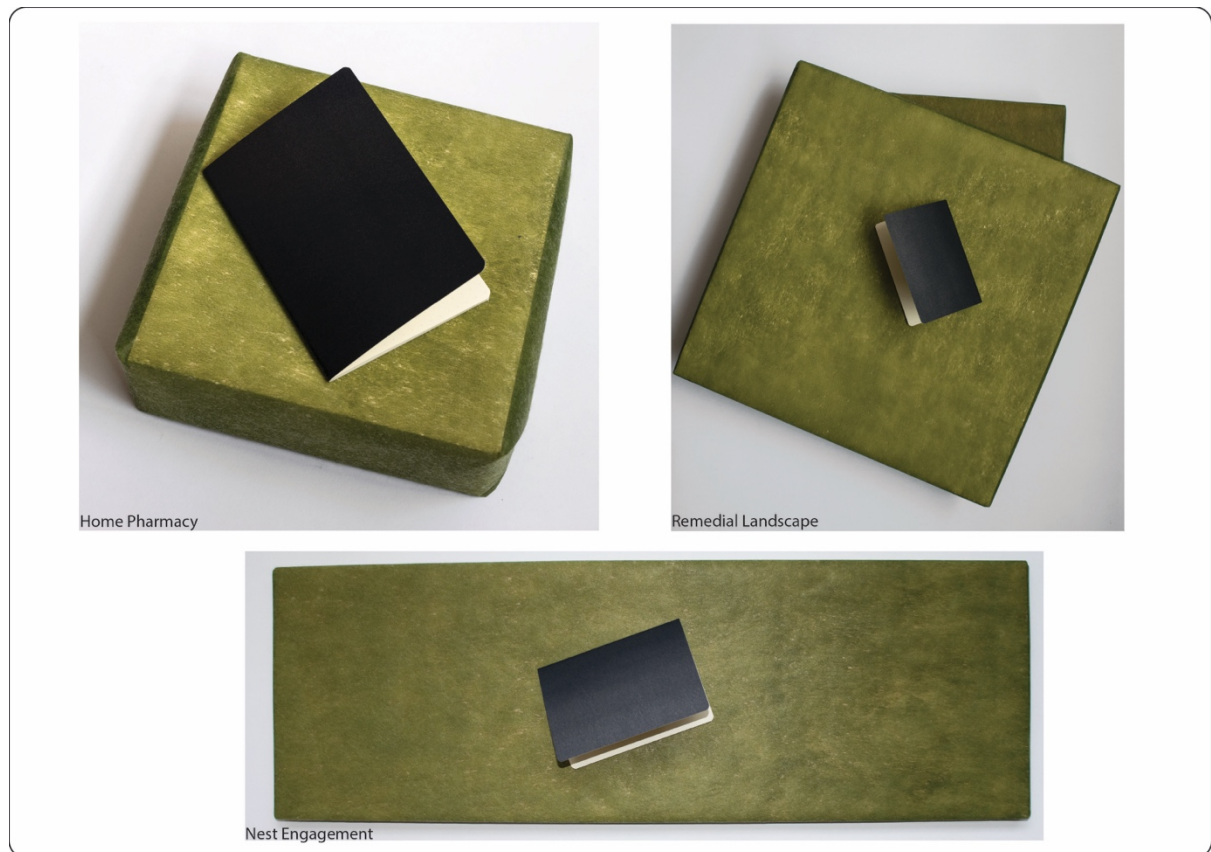


Figure 6:4 The three adoption packages

Each adoption package (Figure 6:5) contained: the textile artefact (made of the textile wall-hanging and envelopes with leaf-shaped or petal-shaped loose fragments of paper infused with essential oils of lavender and peppermint to be added to the wall-hanging [or envelopes in which the leaf-shaped or petal-shaped fragments of paper once taken from the wall-hanging could be placed into]); directions for interacting with the artefact; a print with the story of the nest behaviour of the blue tit; a journal in which to record their interaction; and everything needed for hanging it on the wall (i.e., pins, wooden dowels, hooks attached to the wall-hanging). In this research, the adoption package plays the role of a domestic probe.



Figure 6:5 Contents of the adoption package (*Nest Engagement*)
(Brebenel, 2020)

6.1.2. Results of operationalisation of ‘air pollution at home’

The concept of air pollution at home was operationalised before having participants adopt the textile artefacts. This was done through a survey that took the form of a question sent via a social media platform (i.e., Facebook Messenger). The question was asking twelve of the researcher’s Facebook contacts to name five actions that make them aware of the level of air pollution in the home (Appendix M). Figure 6:6 illustrates the results of this survey, according to which dusting the home, ventilating it, the presence of mould and mildew, as well as the presence of fumes that are produced while cooking, the use of cleaning supplies and the use of paints, varnishes, and solvents were most often associated with air quality. Based on these results the participants were asked questions that relate to dust, ventilation, mould, fumes from cooking/smoking, cleaning supplies, and paint/varnishes. Questions such as ‘how much attention did you pay to dusting the home during the two weeks you had the artefact?’ were asked during the interview as a way to register the participants’ levels of awareness as affected by the presence of artefacts in the home.

SEEING DUST (dusting)	- 8 out of 12 participants
OPENING WINDOWS (ventilating)	- 7 out of 12 participants
NOTICING MOULD and MILDEW	- 6 out of 12 participants
PRODUCING FUMES (from cooking or smoking)	- 6 out of 12 participants
USING CLEANING SUPPLIES	- 5 out of 12 participants
USING PAINTS, VARNISHES, SOLVENTS	- 5 out of 12 participants
USING ARTIFICIAL FRAGRANCES	- 3 out of 12 participants
VACUUMING	- 3 out of 12 participants
TAKING CARE OF PLANTS	- 2 out of 12 participants
CHANGING FILTERS	- 2 out of 12 participants
PET HAIR	- 2 out of 12 participants
OFFGASING (from furniture)	- 1 out of 12 participants
HAVING CARPETS	- 1 out of 12 participants
USING A HUMIDIFIER FOR DRY AIR	- 1 out of 12 participants
USING THE HEATER/AC	- 1 out of 12 participants

Figure 6:6 Results of the operationalisation of the concept of air pollution at home

6.1.3. Recruitment and procedure

The process of recruiting and the procedure involved a variety of steps. It started by asking in person three random acquaintances (single people or couples, none with children) if they would be interested in taking part in the research study. At this point, hard copies of the Participant Information Sheet (Appendix N 1) were provided to them, a document which contained information about the idea of the study, the commitment of the participant, as well as times and deadlines, details of confidentiality and the researcher's professional contact address. Once the acquaintances confirmed their interest they were given the Consent Form (Appendix O 1) to fill out, sign, and date; and after consent was given the adoption packages were delivered to the participants. The artefacts were adopted as seen in Figure 6:7:

Participants to the first adoption experiment	Adopted Artefact
Participant 1 (P 1.1)	<i>Home Pharmacy</i> (Artefact 1.1)
Participant 2 (P 1.2)	<i>Remedial Landscape</i> (Artefact 1.2)
Participant 3 (P 1.3)	<i>Nest Engagement</i> (Artefact 1.3)

Figure 6:7 What artefact was adopted by what participant in the first adoption experiment

The initial engagement with the artefacts consisted of the following steps: (1) opening the adoption package and placing the textile wall-hanging on the wall, (2) reading the story of the nest behaviour of the blue tit, (3) reading the directions for interacting with the artefact, (4) opening an envelope in which a loose fragment was placed, smelling the essential oils, and attaching/detaching the fragment to/from the wall-hanging, and (5) recording the interactions in the journal provided. Steps (4) and (5) were designed to happen repeatedly throughout the two weeks the participants had the artefact in the home. The only information the participants was given in regard to the artefacts was limited to what was written in the Participant Information Sheet and the directions for interacting

with the artefact (Figure 6:8). The goal was to give participants an idea about what the interaction is about, but it did not involve any other instructions, such as when to interact with it, how many times, if to limit their interaction to what was given. The goal was to allow each participant freedom in the way they interact with the artefact, as a way to identify if a pattern is created in the way they interacted with the artefacts (for example, at a certain time of the day, while there are spending time/doing something in proximity of the artefact).

<i>Home Pharmacy</i>	<i>Remedial Landscape</i>	<i>Nest Engagement</i>
<p>In the four coloured boxes you will find fragments that belong to four type of plants: daisy, lavender, mint and yarrow. Place these fragments in their corresponding area on the textile wall-hanging. To do so, slide the little legs of each fragments in the cut-out area of the wall-hanging. Each fragment is different and the easiest way to identify its place is by looking at its shape and finding the same shape on the wall-hanging. Also, they belong to areas that have just an outline. The outline for daisy is orange, the one for lavender is lilac, the one for peppermint is green, and the one for yarrow is yellow.</p> <p>Note: the flower-shaped fragments are impregnated with lavender essential oil and the leaf-shaped fragments are impregnated with peppermint essential oil. The daisy and yarrow fragments are not impregnated with any oils.</p>	<p>Open the envelope labeled 'Peppermint' that has fragments impregnated with peppermint essential oil. To release the peppermint essential oil, unravel the crocheted fragments by pulling the end of the thread. Gradually, the pieces of paper that are covering the front and back of the fragments will detach and fall off.</p> <p>Open the envelope labeled 'Lavender' that has fragments impregnated with lavender essential oil. To release the lavender essential oil unstitch the fragments using a needle by pulling the thread one stitch at a time. Gradually, the pieces of paper that are covering the front and back of the fragments will detach and fall off.</p> <p>Once you reveal one of the fragments that was contained between the two pieces of paper, attach it to the textile wall-hanging in its corresponding area. To do so, tie it to the panel using the thread attached to it to the threads on the wall-hanging.</p>	<p>To release the flower-shaped or leaf-shaped fragments that are impregnated with essential oils, unravel the crocheted fragments by pulling the end of the thread. Gradually, the embroidery-like surface that is covering the flower or leaf fragments will disappear, and the paper on the front and back of the shape will fall off. Please place the pieces of paper that are falling off after the crocheted area is unravelled in the corresponding envelope (i.e., lavender or peppermint).</p> <p>Note: the leaf-shaped fragments are impregnated with peppermint essential oil and are crocheted with different green-coloured threads and the flower-shaped fragments are impregnated with lavender essential oil and are crocheted with different pink/violet-coloured threads.</p>

Figure 6:8 Directions for interacting with artefacts in the first adoption experiment

On the tenth day of having the artefact in the home, the participants were contacted through email to remind them that there are a few days left of the adoption period and asked what would be a good day and time for the return of the adoption package and the interview. Upon an email exchange, a day and time were agreed upon. Each participant was interviewed on Skype and photographs of the artefacts installed in the home were emailed to the researcher. The adoption package was collected soon after.

6.1.4. Collected data

For transcripts of the interviews please see Appendix R 1, for scans of the journals please see Appendix S 1, and for photographs of the artefact in the home please see Appendix T 1. For interviews data reduction please see Appendix U 1.1, and for journals data reduction please see Appendix U 1.2. For interviews and journal data display please see Appendix U 1.3.

6.1.5. Qualitative results

The role that taking inspiration from the nest behaviour at the function level played in raising awareness about air quality

The first part of the hypothesis this research is based on is: *if* participants interact with the textile artefacts repeatedly and are in this way replicating the nest behaviour of the blue tit that has been given ritual qualities, and are made aware of this behaviour, *then* engagement with the textile artefacts could contribute to raising participants' awareness about the health of the home environment with a focus on air quality (see section 4.5.1, p. 82). As a result, data gathered from interviews and journals was reviewed as a way to identify if the participants interacted with the artefacts repeatedly. This was achieved by looking at how participants physically interacted with the artefacts over time, and if there were aspects that influenced when and for how long they would interact with the artefacts, such as where were they situated within the home. An overview of the dates and times each participant interacted with their artefact can be seen in Figure 6:9 in which the data from the journals have been compiled.

Participant	Aug 13 S	Aug 14 M	Aug 15 T	Aug 16 W	Aug 17 R	Aug 18 F	Aug 19 S	Aug 20 S	Aug 21 M	Aug 22 T	Aug 23 W	Aug 24 R	Aug 25 F	Aug 26 S	Aug 27 S	Aug 28 M	Aug 29 T
P 1.1														12:35 PM 7 min add 1:55 PM 7 min add 2:04 PM 7 min add			
P 1.2	8:20 PM 6 min add 8:50 PM 7 min see				11:00 AM ? min add												
P 1.3			6:20 PM 7 min unravel 7:20 PM 10 min unravel	10:10 PM 10 min unravel					5:50 PM 5 min unravel							3:14 PM 5 min unravel	10:45 PM 1 min unravel

Figure 6:9 Journal data from the first adoption experiment which took place
August 13 – August 29, 2017

(yellow marks the two-week period the participant had the artefact in the home and grey marks the days the participant physically interacted with the artefact during the two weeks)

It was found that out of the three participants, only one participant (P 1.3) physically interacted with the artefact repeatedly (i.e., more than once or twice) throughout the two weeks in a spontaneous manner, that is they engaged with it when they had some free time and they were in the proximity of the artefact. The placement of the artefacts in the home (in the bedroom, living room, hallway, etc.) influenced not only the number of times the participants interacted with the artefacts but also the time of the day the engagement took place.

In the process of assigning ritual qualities to the interaction, the engagement with the artefacts meant not only performing the action of taking the fragments out of their envelopes and placing them on the wall-hanging but also reading the story about the blue tit. The goal of these two together was to allow participants to realise how their behaviour at home could be a reflection of what the bird is doing for its nest and thus make them think about their homes with particular emphasis on its health. As a result, when reviewing data from interviews attention was paid to identifying if the participants were able to see the actions they were performing as a replica of the bird behaviour and if they were able to decode the meaning behind the interactions. Out of the

three participants, only one (P 1.2) thought of their behaviour as replicating the bird behaviour. This was due to reading the story of the blue tit which was included with the artefact and to the connection they made between the artefact (which brings with itself essential oils in the home) and the bird which brings plants in the nest. Even though P 1.3 did not show awareness about their behaviour as replicating the bird behaviour, they showed awareness about the home environment, due to the interactive nature of the artefact, and the fact that they engaged with it repeatedly. These repeated interactions with the artefact made P 1.3 think about the possibility of engaging with other objects in the home, and health-related aspects of their home ('that needs washing, that needs Hoovering'). When discussing *Nest Engagement*, they acknowledged that due to its interactive nature, the artefact is designed not only to make you more aware of your surroundings but also 'to perhaps subtly change your habits'.

To clarify, even though the interactions have ritual-like qualities, there is no claim in this research that a ritual was created as a result of engaging with the artefacts for the two weeks, which in turn implies that there is no claim that engaging in this newly created ritual raises participants' awareness about air quality at home.

The role that taking inspiration from the nest behaviour at the symbolic level played in raising awareness about air quality

Added to the first part of the hypothesis this research is based on, there is a second part that says 'and *if* the textile artefacts are mimicking the biological model beyond the behaviour, by replicating the plants the bird is bringing into its nest (through the use of essential oils) and its environment (through the use of materials and imagery that create an aesthetic inspired by the natural world) *then* engagement with the textile artefacts could contribute to raising participants' awareness about the health of the home environment with a focus on air quality (see section 4.5.1, p. 82). The use of essential oils in the design of artefacts and of imagery that creates an aesthetic inspired by the aesthetic of the nest are a reflection of taking inspiration from the biological model at the symbolic level. Taking inspiration at this level had as main goal the strengthening in the participants' minds of the connection between what they were performing as a result of interacting with the artefacts and what the bird does to keep its nest healthy. In addition, the essential oils were used as a way to provoke thought in regard to air quality, due to their association with health. When looking at the data collected (Figure 6:10), it was found that the presence of essential oils did play a role in raising awareness for one participant (P 1.2) as it made them think of (unhealthy) scents in the home, such as the fumes produced while cooking. However, none of the three participants connected the aesthetic of the artefact with the biological inspiration. Even though the aesthetic of the artefacts did not contribute to strengthening the connection to the model, the aesthetic of the artefacts seen as 'delicate' had an impact on the nature of the interactions. In this sense, because the artefacts were viewed as something that needed to be handled with care, the interactions with them were perceived as gentle. This extrapolated to the way of being around the house, whose characteristics became 'a little bit careful and slower and calmer' (P 1.3). Also, this slow way of interacting with the artefacts which was generated by the aesthetic of the artefacts lead to a form of raising awareness that can be viewed as quiet activism. Here, quiet activism is understood as a form of engagement that is characterised by gentleness, slowness and subtlety, with the goal of triggering thought regarding air quality, that is performed within the intimate setting of the home. In addition, the aesthetic played another significant role in this adoption experiment, which will be discussed next.

P 1.1

- o (The story) creates a sort of atmosphere, but it doesn't help with the activity itself
- o I wondered 'why do I have two options? Am I like a bird and I have to know which one I should choose?'

P 1.2

- o We referred back to the story and we discussed it, and we tried to figure things out, like, 'oh but if it's for a nest [...] maybe would have to be something that would cover all our walls'.
- o Maybe I reflected more on it (fumes produced while cooking) , because I had to think about scent.

P 1.3

- o (The story) was something to do with a bird and collecting stuff for its nest. I did not necessary think of that when I was doing it. To me, it did not have a huge importance. I read it and it was a nice description but I did not think about it when I was interacting with it.
- o Maybe being more careful of my environment. And, a bit more mindful of it I suppose. Just mindful of it in the sense that I was paying attention if things needed to be done. I was aware that the object was there and that was something that I could interact with. I became more aware of my surroundings, of what needed to be done [...] it just made me more interested in what was going on in the rest of the house, like 'that needs washing, that needs hoovering'. It just made me think a bit more than I would have normally thought.
- o I was just more aware of it (dust) because I was aware that I was interacting with a piece of furniture or piece of art in my house so I was just thinking 'okay, I am more aware of my surroundings, and my other furniture. So, I started telling my sister 'we need to clean!'
- o (The artefact) is designed to help you interact more with your home environment, and see if it would change the way perhaps you interact with your home environment as well as bringing in an outdoors space into your own home, in a very non-invasive way. That to perhaps subtly change your habits.

Figure 6:10 A selection of data from the first adoption experiment regarding the role of functional inspiration and symbolic inspiration in raising awareness

The role of the aesthetic

Desmet & Hekkert (2007 cited in Zuo, Hope & Jones, 2014) talk about the aesthetic experience as one type of product experiences, where aesthetic experience refers to 'the pleasure or experience of delight gained through sensory channels (Hekkert, 2006; Ulrich, 2007), which is considered to be the immediate feelings evoked when experiencing the product via the sensory system' (Zuo, Hope & Jones, 2014, p.27). Brownell (2014) argues that considering multiple sensory modalities during the design process is likely to create richer, more interesting, and engaging experiences. Even though when the engagement with the artefact was designed the focus was solely on the role physical interaction with the artefact might have, upon reviewing the data collected it was found that apart from the tactile interaction with the artefact, visual and olfactory interaction with the work also played an important role in the experience that was created. One of the participants went on to describe the experience as 'sensorial' since they realised engagement with the artefact did not happen only through the sense of touch (by having to handle the artefact), but also through the sense of smell (by smelling the essential oils) and the sense of sight (by looking at the artefact). Because of this, for each participant, engagement with the artefact felt relaxing. Engagement with the artefact promoted wellbeing at home by bringing about relaxation due to the light colours and smooth textures of the artefact, and the discrete scent of essential oils. The sense of relaxation and wellbeing was also brought through engagement in the interactions that have ritual-like and that are characterised by slowness, repetition, and gentleness. The participants stated that the artefacts 'relieve stress' because 'while you are doing this, you are not thinking of anything else' (P 1.1), 'engaging visually would distract me from other things in my life' and it would make the space 'calming' (P 1.2), and because it gives busy people a 'bit of time out, even if it is just to spend a few minutes with it here and there' (P 1.3). This is in line with what was mentioned in the discussion about biophilia and biophilic design, where it was found first, that engaging not only the visual sense, but also the olfactory sense plays a role in generating a sense of wellbeing. And second, that experiencing nature in the indoor environment through the visual sense and tactile sense allows for

a meditative type of experience to be generated that also contributes to participants' wellbeing. The role that the activity that involved the interaction with the artefacts played in the wellbeing of the participants can also be explained by the theory on occupational therapy that according to World Federation of Occupational Therapists (2010c, in Hammell, 2018) is concerned with promoting health and wellbeing through occupation, and that does not only contribute to the wellbeing of those whose health is compromised, but is important to the wellbeing of all people. Figure 6:11 contains a selection of excerpts from the first adoption experiment interviews and journals, which capture the experience of each participant.

P 1.1

- o It was fun, very nice in the sense of how it was presented, and the craft, and the details of everything. I think that was fantastic. It was nice to do it for a couple of hours. Just to do that and nothing else.
- o While you are doing this, you are not thinking of anything else [...] is sort of a puzzle, related to nature and scents. A wall poster puzzle.
- o I am enjoying the craft, the amount of work to create the patterns.

P 1.2

- o I don't know if it's because of the elements that are represented, but it does remind me of nature, and it has some kind of calming presence. [...] maybe it's the colors, the use of very light colors.
- o You feel that is delicate, and it's something that was carefully packaged so that sense extrapolates for the activity. It makes you think it should be carefully done [...] something precious.
- o We were speculating on it, and we discussed saying 'maybe it would have to be something like wallpaper, or something that you put all over the walls'.
- o It blended in with our usual furniture, and it fits very well with the colors of our house. We have an off-white wall, and it just blended in and it became kind of invisible [...] it is not disruptive at all of our daily lives, and somehow, I think that maybe it could be a little more.
- o (It is a) painting that you could smell [...] can improve your home by making it more pleasant [...], it's got nice colors, it looks good on my wall, and I like the idea of having something that smells nice on my wall [...] In some way, it was like when I buy flowers and sometimes go and smell them. And, I did the same with the piece. Sometimes I would remember is there, and I would go and smell it so the engagement with it was definitely more of a sensorial level than, than with other objects I have.
- o It would distract me from other things in my life. The fact that it had those shapes, that were more sort of abstract it would made want to try to find something about them, try to figure out what they were. You know, it's like when you cloud watch.

P 1.3

- o It is quite relaxing as well, quite a nice thing to interact with after a busy day.
- o Because it was such a delicate piece and you are pulling off the threads you have to quite careful with it anyways. I don't know if it did impact me but it might have made me a little bit careful and slower, and calmer around the house. I don't know if I was conscious about that.
- o It was nice interacting with it as a piece of furniture or art. [...] I enjoyed interacting with that as an item in my house as opposed to using it for cooking or for washing or whatever it might be. It was nice to do it as something just for enjoyment and not that was a necessity; just something to do without apparent outcome or reason, just to make me happy and relaxed.
- o It could be nice for people who are busy to have it as well, because it will give them a change to interact with their home and be aware of their surroundings. And just give them a bit of time out, even if it is just to spend a few minutes with it here and there.

Figure 6:11 A selection of excerpts describing the role of the aesthetic of the artefacts and interactions in the first adoption experiment

The feedback on the design of the artefacts

Because these artefacts are seen as research instruments that were be in a participant's home for a limited amount of time (i.e., two weeks), they were designed to be as easily integrated into participants' homes as possible. For this reason, feedback in regard to the design of the three artefacts was asked, with an emphasis on scale and installation. The participants' responses have indicated that: the smallest-scale artefact (i.e., *Nest Engagement*) was considered to be the easiest to accommodate in the home; and that sometimes the installation was 'difficult' mostly because the pins were very small and the walls were very hard, otherwise it was seen as 'easy'. Additionally, because there was a need to make sure the level of skill the interactions demanded was appropriate,

and it did not cause distress to the participants which could potentially stop them from interacting with the artefact, feedback in regard to the design of interactions was asked. All participants agreed that the level of skill that the overall engagement with the artefacts required was 'appropriate', however, P 1.2 did say one part of the interaction was 'challenging' because the threads used to tie the fragments to the wall-hanging were too thin and therefore hard to handle and fragile. Because of that, the threads broke, which also happened when interacting with *Nest Engagement*. In addition to this feedback, participants also had recommendations regarding the future design of the artefacts, that is P 1.3 'wished there were larger fragments that could take longer to unravel'.

Shortcomings of the first adoption experiment

Matellmaki (2006) argues that 'the challenge for probe studies is the uncertainty of the participants' motivation and their intention to utilise their probe kits.' The second part of this statement was the challenge that was encountered during the first adoption experiment. This was generated by two factors: insufficient information (from myself to the participant) and lack of participant availability. Both factors presented a challenge since they limited the amount of data generated during the first adoption experiment. One of the goals of the first adoption experiment was to test how much information the participants should receive regarding what they were asked to do. Because the experience that was created was meant to be unique to each participant, the amount of information that was given to the participants was limited to what was written in the Participant Information Sheet and the directions that came with the artefact. However, this openness influenced the participants' involvement with the artefact, and as a result, there were participants from which not much data could be gathered, since they only had the artefact out of the package once during the time they interacted with it and only for a few hours. At this point, it became obvious that it needs to be communicated clearly to the participants that taking part in this study involves having the work installed in the home for the two weeks as exposure to the artefact leads to repeated engagement with the artefact. The other factor that limited the amount of data that was generated during the first adoption experiment, was the lack of participants' availability during the time they had the artefact in the home. Because participants seemed to have difficulty in finding time to regularly engage with the artefact during the two weeks (see an excerpt from P 1.2' interview below), the decision to introduce a tool which can help in providing information in regard to the availability of the interested participants during the two weeks was implemented.

'When it arrived, we thought that it would be something that we would engage more with [...] We don't have much time in daily life, so I ended putting it (the fragment) up just with pins [...] I was not patient enough to do it (the way it was designed). And I am used to that kind of things, but in my daily life, I definitely don't have the availability to think 'oh, now I am going to take all this time to do this' [...] It made me realise how unavailable I am for slow activities. I find that unfortunate. That was definitely true, that I did not have enough availability, so I thought 'oh, why don't I do this with pins?' P 1.2

Conclusions of the first adoption experiment

Two out of the three participants showed awareness about air quality, however, while one participant was aware because they thought of their behaviour as replicating the nest behaviour, and because they associated essential oils with healthy air; the other participant showed awareness because they had to interact with the artefact and that interaction made them think about

interactions with other objects in the home, with a focus on actions that would make the home environment healthier, for example, cleaning and tidying. This also suggests that in addition to making the participant aware because they engage with their space more, interacting with this type of artefact also empowers the participant, it reminds them that they have control over their space, and inspires them to act by providing them with an example of how they can go about that. Based on the findings of this adoption experiment, it is argued that an awareness of the participants' behaviour as a replica of the bird behaviour (through reading and remembering the story of the bird and performing the interactions), the use of essential oils in the design of artefacts (as an extension of the symbolic inspiration), and the interactive quality of the artefacts, are important as these played a role in raising participants' awareness about air quality. In regard to the aesthetic of the artefacts, even though the use of bio-inspired imagery did not play a role in raising awareness, because of the positive role it played in this adoption experiment, in regard to wellbeing, the focus on the aesthetic of the artefacts and the nature of interactions will be maintained in the next adoption experiment. In addition to the aesthetic of the artefacts which increased participants' wellbeing by bringing about a sense of relaxation and by relieving stress, the nature of the interactions, as slow and meditative, also contributed to that since it allowed participants to take the time for reflection.

The outcomes from this trial test informed, on one hand, the design of the next adoption experiment, in regard to the recruitment process and the instructions about what participating in the adoption experiment means; and on another, the future iterations of the textile artefacts, adjusting their scale, their installation system, and refining the design of interactions.

6.2. The second adoption experiment

The second adoption experiment took place in Halifax, Nova Scotia, Canada in January-February 2018 and involved six participants, each having a textile artefact in their home for two weeks, time during which they were invited to install the artefact, engage with it, record their engagement in the journal provided, and take one photograph of the work while installed in the home. Similarly to the first adoption experiment, the main goal of this testing was to identify if engagement with the artefacts could raise participants' awareness about the home environment with a focus on air quality.

6.2.1 Textile artefacts for the second adoption experiment

Six textile artefacts (Figure 6:12) were evaluated during the second adoption experiment: five (*Artefact 2.1*, *Artefact 2.2*, *Artefact 2.3*, *Artefact 2.4*, *Artefact 2.5*) that were created for this experiment, and *Nest Engagement* (also known in the second adoption experiment as *Artefact 2.6*) from the first adoption experiment. *Nest Engagement* was used again as the qualitative results of the first adoption experiment revealed that interactions with this artefact raised participant's awareness about the health of their home environment, allowed for a positive sensorial experience to be created, and was the easiest to accommodate in the home.



Figure 6:12 The six artefacts (*Artefact 2.1*, *Artefact 2.2*, *Artefact 2.3*, *Artefact 2.4*, *Artefact 2.5*, *Artefact 2.6*) evaluated during the second adoption experiment

The same procedure for designing and making that was followed in the design the artefacts for the first adoption experiment was followed in the design of these artefacts as well. These included taking inspiration from the biological model at the function level by translating the nest behaviour of the blue tit into a particular type of interaction, that is an interaction that has ritual-like qualities, and communicating to the participants the inspiration behind the artefacts (which was done by giving to the participants a print out which describes the bird behaviour and states that the artefact is inspired by that behaviour). Additionally, it included taking inspiration from the model at the symbolic level by utilising the essential oils as an extension of the plant fragments the bird is bringing into its nest. Even though the bio-inspired aesthetic (which was seen as a reflection of the symbolic inspiration taken from the biological model) did not play a role in raising awareness it played a role in increasing participants' wellbeing, and therefore these artefacts are continuing to have a bio-inspired aesthetic. Lastly, it also took into consideration the materials and processes utilised in the making of the artefacts.

The interactions each of the five artefacts included were informed by the interactions in the three sets of small-scale samples. The choice of materials and processes was informed by the material experimentations in the small-scale samples. In addition, the design of artefacts also included the feedback received at the end of the first adoption experiment. In this sense, the choice of materials had into consideration the physical properties of the materials utilised (as a result new thicker threads were introduced to avoid the threads from breaking when handling the fragments); and, in terms of design, there was further experimentation with the time the unravelling of the loose fragments can take. When considering the processes used to make the artefacts, transfer printing was introduced as a process to create the wall-hangings of two of the five new artefacts created, used alongside digital printing which was utilised to create one wall-hanging, and screen printing utilised to create another wall-hanging. The fifth wall-hanging did not involve any printing, instead, the wall-hanging was made entirely of Arches paper hand-painted flower-like shapes hand embroidered on a fabric made of pineapple fibre. Here, every two artefacts explored a different strategy for interaction and utilised the materials and processes that best work for that interaction (while considering the physical properties of the materials) as follows.

Artefact 2.1 (Figure 6:13) and *Artefact 2.2* (Figure 6:14) are based on the medium-scale samples for set no. 1 and use the strategy of placing fragments to the wall-hanging by the means of pockets in

which loose fragments can be placed. The textile wall-hanging for *Artefact 2.1* is made of a fabric made of pineapple fibre hand-embroidered with flower-shaped fragments of non-woven linen and hand-painted Arches paper. The textile wall-hanging for *Artefact 2.2* is made of a transfer print on polyester dorado using disperse dyes, on top of which flower-shaped fragments of pineapple fibre have been hand-embroidered. The choice of a transparent material such as fabric made of pineapple fibre was a way to allow for the loose fragments to be seen, and for the scent to be felt while in the proximity of the artefact.

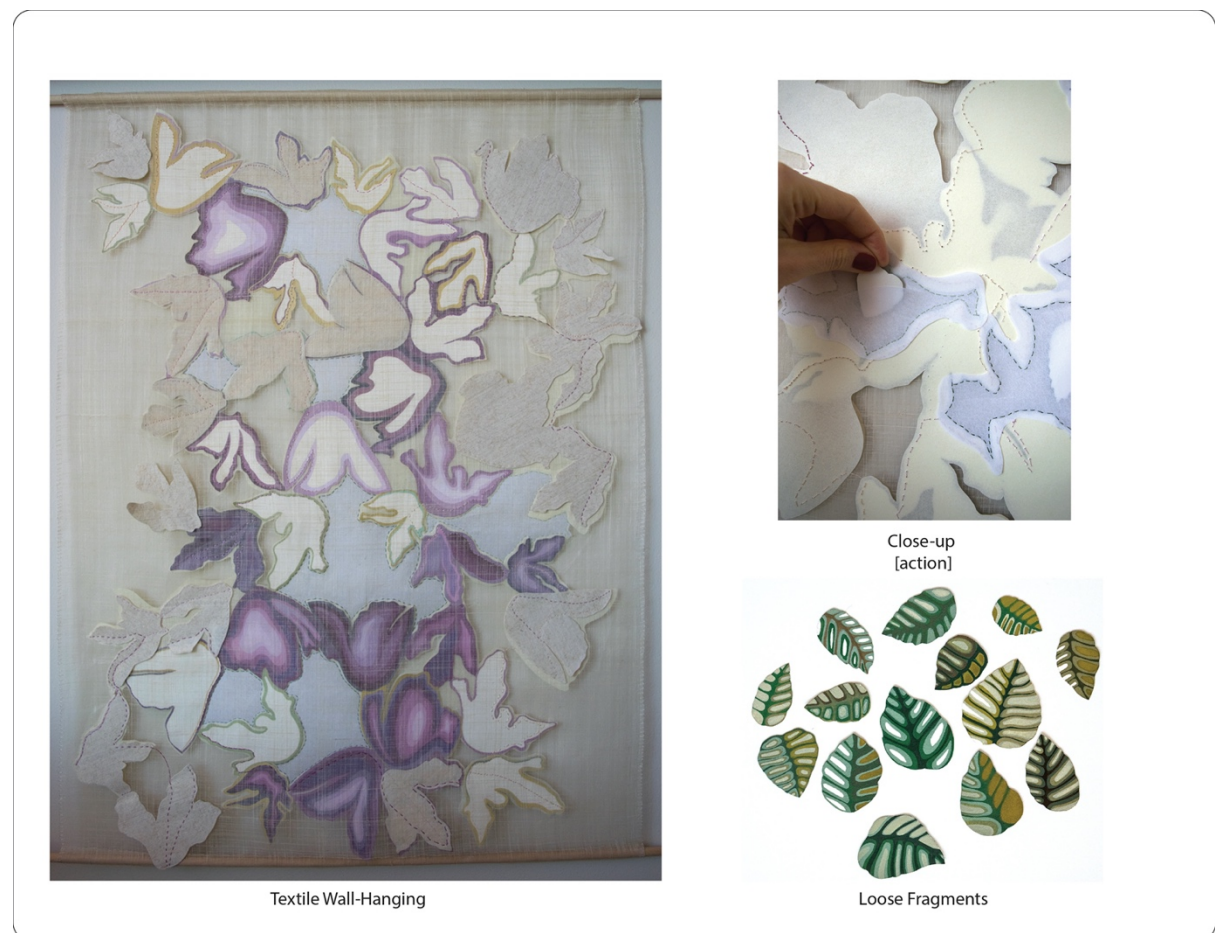


Figure 6:13 *Artefact 2.1*

(for information about scale, materials, processes, and interaction please see Appendix D 1)



Figure 6:14 *Artefact 2.2*

(for information about scale, materials, processes, and interaction please see Appendix D 2)

Artefact 2.3 (Figure 6:15) and *Artefact 2.4* (Figure 6:16) are based on the medium-scale samples for set no. 2 and use the strategy of tying, as well as the unstitch strategy. The textile wall-hanging for *Artefact 2.3* is made of a transfer print on polyester dorado using disperse dyes, and it has hand-embroidered shapes of flowers on top. The textile wall-hanging for *Artefact 2.4* is digitally printed on cotton gauze using textile pigments and has flower-shaped fragments of hand-painted Arches paper hand-embroidered on it, fragments which were then enclosed between two pieces of pergaminata paper.



Textile Wall-Hanging



Close-up
[action]



Loose Fragments

Figure 6:15 *Artefact 2.3*

(for information about scale, materials, processes, and interaction please see Appendix H 1)



Figure 6:16 *Artefact 2.4*

(for information about scale, materials, processes, and interaction please see Appendix H 2)

Artefact 2.5 (Figure 6:17) is very similar to *Artefact 2.6* (*Nest Engagement*) which is based on the medium-scale samples for set no. 3 and uses the strategy of unravelling crochet. The only difference between *Nest Engagement* and *Artefact 2.5* is the type of fabric used (i.e., silk gauze versus silk organza), and a slightly different scale. The textile wall-hanging for *Artefact 2.5* is made of silk organza screen-printed by hand using textile pigments.



Figure 6:17 Artefact 2.5

(for information about scale, materials, processes, and interaction please see Appendix L 1)

The scale of these artefacts was informed by the results of the first adoption experiment, which identified the smallest artefact (i.e., *Nest Engagement*) as being the easiest to accommodate in the home. As a result, even though not all artefacts had the same dimensions, their scale was close to the scale of *Nest Engagement*, which measured 60 cm by 85 cm.

Each adoption package (Figure 6:18) contained the same items like the adoption packages from the first adoption experiment, that is: the textile artefact (comprised of the textile wall-hanging, and envelopes with leaf-shaped or petal-shaped loose fragments of paper infused with essential oils of lavender and peppermint to be added to the wall-hanging [or envelopes in which the leaf-shaped or petal-shaped fragments of paper once released from the wall-hanging could be placed into]), directions of interacting with the artefact, a print with the story of the nest behaviour of the blue tit, a journal in which to record the interactions, and everything needed for hanging the artefact on the wall (i.e., pins, wooden dowels, hooks attached to the wall-hanging).



Figure 6:18 Contents of the adoption package in which *Artefact 2.3* was placed

6.2.2 Recruitment and procedure

The process of recruiting and the procedure involved a variety of steps. The recruitment process is different than the recruitment process from the first adoption experiment, in that it allows to select participants taking into consideration their availability during the two weeks they will have the artefact in the home. This is because it is important to make sure that all participants to the second adoption experiment have availability during the two weeks of the experiment. To achieve that, the Adoption Form (Appendix P) was introduced. This is a selection tool that consists of two examples of possible artefacts to be adopted and a series of questions. The structure of the Adoption Form was inspired by the adoption form Dunne & Raby (2001) used in their Placebo project. Because the main selection criterion was the availability of the participants during the two weeks the first question was 'how much time do you anticipate to spend at home for the duration of the two weeks you would have the artefact in your home?'. There were however other selection criteria included, such as their interest in this type of artefact and their home, as well as in this research project (i.e., they find it engaging). The purpose of introducing the other criteria was to heighten the participants' awareness about the importance of the study. With the Adoption Form, I wanted to give participants a sense of responsibility towards the artefact, not suggesting in any way that they need to interact with it, but that they need to be exposed to it (by displaying it into the home).

The recruitment started with an open call (i.e., an invitation to participate in this study), which took the form of an email (Appendix Q 1) sent by NSCAD University's research officer to all faculty, staff

and graduate students at NSCAD University, Saint Mary's University, Dalhousie University and Mount Saint Vincent University, all higher education institutions in Halifax, Nova Scotia, Canada. The recruitment email was accompanied by the revised Participation Information Sheet (Appendix N 2). After reviewing the revised Participation Information Sheet interested participants were invited to contact the researcher in order to express their interest in taking part in the project. Ten people replied to the call communicating their interest in the research project. At this point, the Consent Form (Appendix O 2) and the newly introduced Adoption Form were emailed to the participants, which the participants were required to sign, date, and respectively fill out and submit by email to the researcher. Six people replied with the completed Consent Form and Adoption Form. After consent has been given, the responses in the Adoption Form were reviewed and the six participants to take part in the study were contacted to arrange for the delivery of the adoption packages. The artefacts were adopted as seen in Figure 6:19.

Participants to the second adoption experiment	Adopted Artefact
Participant 1 (P 2.1)	Artefact 2.1
Participant 2 (P 2.2)	Artefact 2.2
Participant 3 (P 2.3)	Artefact 2.3
Participant 4 (P 2.4)	Artefact 2.4
Participant 5 (P 2.5)	Artefact 2.5
Participant 6 (P 2.6)	Artefact 2.6 (<i>Nest Engagement</i>)

Figure 6:19 What artefact was adopted by what participant in the second adoption experiment

The initial engagement with the artefacts involved the same five steps as in the first adoption experiment: (1) opening the adoption package and installing the textile wall-hanging in the home, (2) reading the story of the blue tit, (3) reading the directions for interacting with the artefact, (4) opening an envelope in which the loose fragment was placed, smelling the essential oils, and attaching/detaching the fragment to/from the wall-hanging, and (5) recording the experience in the journal provided. Except for installing the artefact, the other steps were designed to be repeated as many times as the participant wanted. The participants were made aware of what the engagement with the artefacts involved, through the directions for interacting with the artefacts (Figure 6:20), the Participant Information Sheet, and the Adoption Form. The participants were provided with this information as a way to make sure they understood that, while engaging with the artefact repeatedly is their decision, having the artefact displayed in the home for the two weeks, and thus allowing themselves to be exposed to the artefact, it is a requirement for this study.

<i>Artefact 2.1</i>	<i>Artefact 2.2</i>	<i>Artefact 2.3</i>	<i>Artefact 2.4</i>	<i>Artefact 2.5</i>	<i>Artefact 2.6 (Nest Engagement)</i>
<p>Take out of one of the envelope the painted leaf-shaped fragments and place them in the pockets on the back of the textile wall-hanging. Each envelope contains 2 to 3 leaf-shaped fragments, which you can place in any of the 6 pockets that are on the back of the textile wall-hanging. The fragments will not only add additional color to the textile wall-hanging, but will also release essential oil scent.</p> <p>Note: the leaf-shaped fragments are impregnated with peppermint essential oil.</p>	<p>Open up one of the envelopes and take out one of the fragments. To release the fragment impregnated with essential oil untie the bow, and then unravel the crochet by pulling the end of the thread. Once released, take the fragment and place it in its corresponding pocket (that is, the pocket that has a scale similar to that of the loose fragment) on the textile wall-hanging.</p> <p>Note: the fragments that are placed in the envelope titled 'Lavender' are impregnated with lavender essential oil, and the fragments that are placed in the envelope entitled 'Peppermint' are impregnated with peppermint essential oil.</p>	<p>Open up one of the envelopes and take out one of the fragments. To release the fragment impregnated with essential oil untie the bow, and then unravel the crochet by pulling the end of the thread. Once released, take the fragment and find its corresponding shape (that is, the shape that has a scale similar to that of the fragment) on the textile wall-hanging. Use the threads attached to the fragment and the threads on the textile wall-hanging to attach the fragment to the wall-hanging.</p> <p>Note: the fragments that are placed in the envelope titled 'Lavender' are impregnated with lavender essential oil, and the fragments that are placed in the envelope entitled 'Peppermint' are impregnated with peppermint essential oil.</p>	<p>To release the flower-shaped fragments that are impregnated with essential oil, untie the bow, and then unravel the crochet by pulling the end of the thread. When you are done unravelling the crochet, the paper on the front of the shape will fall off. Please place the pieces of paper that are falling off after the crocheted area is unravelled in the provided envelope titled 'Lavender'.</p> <p>Note: the flower-shaped fragments are impregnated with lavender essential oil.</p>	<p>To release the flower-shaped or leaf-shaped fragments that are impregnated with essential oils, unravel the crocheted fragments by pulling the end of the thread. Gradually, the embroidery-like surface that is covering the flower or leaf fragments will disappear, and the paper on the front and back of the shape will fall off. Please place the pieces of paper that are falling off after the crocheted area is unravelled in the corresponding envelope (i.e., lavender or peppermint).</p> <p>Note: the leaf-shaped fragments are impregnated with peppermint essential oil and are crocheted with different green-coloured threads, and the flower-shaped fragments are impregnated with lavender essential oil and are crocheted with different pink/violet-coloured threads.</p>	<p>To release the flower-shaped or leaf-shaped fragments that are impregnated with essential oils, unravel the crocheted fragments by pulling the end of the thread. Gradually, the embroidery-like surface that is covering the flower or leaf fragments will disappear, and the paper on the front and back of the shape will fall off. Please place the pieces of paper that are falling off after the crocheted area is unravelled in the corresponding envelope (i.e., lavender or peppermint).</p> <p>Note: the leaf-shaped fragments are impregnated with peppermint essential oil and are crocheted with different green-coloured threads, and the flower-shaped fragments are impregnated with lavender essential oil and are crocheted with different pink/violet-coloured threads.</p>

Figure 6:20 Directions for interacting with artefacts in the second adoption experiment

On the tenth day of having the artefact in the home, the participants were contacted through email to be reminded that there are a few days left of the adoption period and asked what would be a good day and time for the return of the adoption package and the interview. Upon an email exchange, a day and time were agreed upon. Participants were interviewed in person, time at which the adoption packages were returned. Soon after the interview, photographs of the artefacts installed in the home were emailed to the researcher.

6.2.3 Collected data

For transcripts of the interviews please see Appendix R 2, for scans of the journals please see Appendix S 2, and for photographs of the artefacts in the home please see Appendix T 2. For interviews data reduction please see Appendix U 2.1, and for journals data reduction please see Appendix U 2.2. For interviews and journals data display please see Appendix U 2.3.

6.2.4 Qualitative results

The role that taking inspiration from the nest behaviour at the function level played in raising awareness about air quality

The first part of the hypothesis this research is based on is: *if* participants interact with the textile artefacts repeatedly and are in this way replicating the nest behaviour of the blue tit that has been given ritual qualities, and are made aware of this behaviour, *then* engagement with the textile artefacts could contribute to raising participants' awareness about the health of the home environment with a focus on air quality (see section 4.5.1, p. 82). As a result, data from interviews and journals was reviewed as a way to identify how many times participants interacted with the artefacts over the two weeks, and to identify if there were aspects that influenced for how long and when they interacted with the artefacts, such as where were they situated within the home. An overview of the dates and times each participant interacted with their artefact can be seen in Figure 6:21 in which the data from the journals have been compiled.

Participant	Jan 19 F	Jan 20 S	Jan 21 S	Jan 22 M	Jan 23 T	Jan 24 W	Jan 25 R	Jan 26 F	Jan 27 S	Jan 28 S	Jan 29 M	Jan 30 T	Jan 31 W	Feb 1 R	Feb 2 F	Feb 3 S	Feb 4 S	Feb 5 M	Feb 6 T	Feb 7 W
P 2.1		1:00 PM 30 min install		9:00 AM 30 min add see		2:00 PM 15 min add see		5:30 PM 20 min add see			8:30 PM 10 min add			10:50 AM 15 min add						
P 2.2			4:00 PM 30 min add	10:00 AM all day in the room	6:00 PM 3 ½ hours in the room	7:00 PM 1 hour add	8:30 PM 2 hours talk about the artefact	7:00 PM 2 ½ hours add	9:30 AM 1:15 hour add	11:00 AM 45 min in the room	6:30 PM 3 hours see	8:00 PM 2 hours add	6:00 PM 1 ½ hour in the room	7:30 PM 1 ½ hour add	6:00 PM 1:15 hour in the room	2:15 PM 1:45 hour in the room				
P 2.3		AM 30 min add install	PM 15 min add						AM 5 min add	AM ? min add	PM ? min add									
P 2.4	7:30 PM 45 min install	9:40 AM 5 min see	12:30 AM 2 min unravel	6:15 AM 5 min unravel	7:45 AM 5 min see	7:00 AM 4 min see	7:30 AM ? min touch	7:30 AM 4 min see	9:00 AM 1 ½ hour see	10:30 AM 1 hour see	6:15 AM 20 min see	7:15 AM 10 min see	7:30 AM 20 min see	4:30 AM 20 min see						
	10:00 PM 5 min unravel	11:30 AM 5 min unravel	10:30 AM 6 min unravel	6:45 PM 5 min unravel	6:30 PM 3 min see	6:30 PM 1 min touch	6:45 PM 2 min see	7:00 PM 2 hours see	3:00 PM 2 ½ hours see	4:30 PM 2 hours see	7:30 PM 5 min see	8:00 PM ? min touch	5:30 PM 6 min touch	6:30 PM 7 min touch						
	2:00 PM 2 min unravel	1:30 PM 5 min unravel	11:30 PM 2 min see	11:00 PM 3 min see	9:30 PM 2 min see	10:00 PM 3 min see			8:00 PM 5 min change the display	11:00 PM 5 min see	10:30 PM 2 min change the display	10:30 PM 1 hour see	11:30 PM 5 min see							
	5:30 PM 1 min see	6:30 PM 1 min see	8:15 PM 8 min unravel	9:10 PM 6 min see		11:30 PM 3 min see														
	9:30 PM 2 min unravel																			
P 2.5		10:00 AM 10 min install touch see	5 to 10 times for a few minutes all day touch see	1:30 PM ? min unravel	8:00 AM ? min see	see	see	see	9:34 AM ? min unravel			12:04 PM ? min unravel	7:15 AM ? min see	see	11:12 PM ? min unravel					
P 2.6						2:15 PM ? min install	? AM/PM ? min see	? AM/PM ? min see	? AM/PM ? min unravel	? AM/PM ? min unravel	? AM/PM ? min see	? AM/PM ? min unravel	? AM/PM ? min see		? AM/PM ? min unravel	? AM/PM ? min unravel	? AM/PM ? min unravel	? AM/PM ? min unravel	? AM/PM ? min unravel	? AM/PM ? min unravel

Figure 6:21 Journal data from the second adoption experiment which took place

January 19 – February 7, 2017

(yellow marks the two-week period the participant had the artefact in their home and grey marks the days the participant physically interacted with the artefact during the two weeks)

It was found that all participants physically interacted with the artefacts repeatedly throughout the two weeks. Placing the artefacts in areas where there was exposure allowed for engagement less

deliberately and increased the possibility of repetitive engagement. The time of the engagement was spontaneous for all participants and just dictated by the time the participants were in the space and their availability. Only P 2.1 was prompted by the two-week time constraint to interact with the artefact ('when I opened it [the package] and saw there are six envelopes and that I have two weeks, I calculated how much time should I be spending on average').

It was also found that all participants were aware of the story of the bird during the time they had the artefact in their home. For P 2.1 and P 2.5 this awareness manifested in the form of creating a parallel between the behaviour of the bird and their actions as participants; for P 2.2 and P 2.3 in the association they made between the nest of the bird and their home; for P 2.3, P 2.4 and P 2.6 in wondering if the act they were performing had a similar effect on their home to the one that the bird was performing. None had clarity about the latter since nowhere in the adoption package nor the Participation Information Sheet this claim was made. Nonetheless, participants enjoyed thinking that the act they were performing was 'very natural' because 'we see it in nature, and therefore it's okay if you are doing this yourself' (P 2.2). Furthermore, not only did the bird story make them think about their home in relation to its health, but it stimulated them to problem-solve how they could further act to replicate that behaviour. In that regard, P 2.2 thought of 'using essential oils as a healthy alternative to fragrances that are more chemical', P 2.3 thought of 'using less abrasive, more gentle cleaning products', P 2.4 of 'using natural cleaning products', P 2.5 of 'keeping their house clean' and P 2.6 wondered if 'they should bring big pots of lavender and mint into their home' for the plants to have the same effect.

The clarification that was made when discussing the qualitative results of the first adoption experiment, also applies here. That is, even though the interactions have ritual-like qualities, there is no claim in this research that a ritual was created as a result of engaging with the artefacts for the two weeks, which in turn implies that there is no claim that engaging in this ritual raises participants' awareness about air quality at home.

The role that taking inspiration from the nest behaviour at the symbolic level played in raising awareness about air quality

Added to the first part of the hypothesis this research is based on, there is a second part that says 'and *if* the textile artefacts are mimicking the biological model beyond the behaviour, by replicating the plants the bird is bringing into its nest (through the use of essential oils) and its environment (through the use of materials and imagery that create an aesthetic inspired by the natural world) *then* engagement with the textile artefacts could contribute to raising participants' awareness about the health of the home environment with a focus on air quality (see section 4.5.1, p. 82). Since thought in relation to air quality was provoked through the use of essential oils, when asked directly about the use of essential oils, P 2.2 was the only one that made the association of the home to the bird's nest ('maybe it is some kind of purification in my nest'). However, at other points throughout the interview P 2.3, P 2.4 and P 2.6 also made the connection between the bringing of the plants in the nest of the bird and the bringing of essential oils in the home, and wondered if the oils function in a similar way to the plants (i.e., 'detoxifying the home', 'purifying the home' or 'absorbing anything bad' in the room). The imagery, which was intended to strengthen in the participants' mind the connection to the bird's nest, did make participants think about aspects (i.e., shapes, colours) of the natural world, but did not help with connecting the home with the nest. Knowing about the

story of the bird, performing the behaviour, and the use of essential oils created much stronger associations. Nevertheless, the aesthetic played a similar and important role in the engagement with these artefacts which will be discussed next.

Figure 6:22 includes a selection of interview data regarding the role of functional inspiration and symbolic inspiration in raising awareness.

P 2.1

- o (The story) helped me understand why you chose the interaction you chose, the prompt [...] why you are asking me to engage with it in that way.
- o The blue tit bird is doing this for its baby birds in its nest, so there is that motivation, but then when I think about an artwork that can by nature live by itself on the wall, then I am thinking what is the thing that will keep me wanting to get back to it many years from now.
- o It reminded me that I have a few plants at home, and that they exist just simply because of the action that I was taking with the artefact to care for it [...] I did not realize that might happen, but as I was handling the leaves, I was thinking, oh, I guess I should water that plant now because that needs some attention as well.

P 2.2

- o I think linking it to the blue tit straightened that connection with nature further in my mind, which made me feel that whatever I was doing with this artefact was very natural, healthy, good for me [...] your act of making you house feel calm and nicely fragranced is actually very natural, we see it in nature, and therefore it's okay if you are doing this yourself. It makes it feel positive [...] I liked the idea that maybe it was some kind of purification in my nest, if I was the blue tit.
- o I felt that I was much more aware of it (the artefact) than I was about other pieces of artwork that I had control over.
- o I certainly felt that I had this special thing in my house so maybe I also felt like the rest of the room should reflect how special that thing felt. Which made me think 'I need to clean my house'.
- o They would feel like the little bird putting these little bits in their nest as well.
- o I certainly thought about incorporating essential oils into cleaning more.

P 2.3

- o I knew it mimics the behaviour of the little bird, the blue tit, to purify its nest. It made me feel good. I don't know if it actually did, but just the notion of 'that is what is supposed to do', made the whole bedroom feel cleaner or fresher.
- o You feel you are more connected with nature. But I also felt [...] I should work harder to improve the quality of my home.
- o I added the fragments to improve the quality of my home [...] the air quality, kind of purifying my home.
- o I think about using less and less abrasive, more gentle products.

P 2.4

- o There were times when I was wondering if they (essential oils) were detoxifying my home.
- o I definitely thought of different ways of bringing that type of world inside my home. I think that last weekend I went and bought a big bag of potting soil and I am going to start planting some flowers [...] also, because I really like the smell of these petals, using more natural oils into the home is something that I want to try.
- o Having this piece reminded me that engaging with your space can make a huge difference in my impression of it.
- o It was cool having something that I could touch and unravel at my own pace. It made me think it might be cool to do something like this again in my home [...] it could be objects that I could interact with or art that I could interact with. It changes the way I engage with my space [...] it really improves my engagement with my space.
- o It made me think about using natural cleaning products.

P 2.5

- o I watched birds make their nest quite often. So, it felt quite special to have the idea that I was doing something similar.
- o I am really prone to dissociating from my environment if I am stressed out or if I am tired or sick. I just block everything. So, the idea of interactive pieces is probably a healthy one to stop that blocking and not only calm yourself down or put yourself into better spirit but also this dissociation is never healthy, and we do it too much especially in the city.
- o It opened my mind as to the purpose of things in the home [...] and, it made me engage a little bit more (with my home).
- o I paid quite a bit of attention to the level of dust in my home.

P 2.6

- o I didn't really make the association of plants making the house healthy. Although now that we are talking about it I feel like that bird brings plants into the nest and the nest is small, and the plants are small, should I be bringing something huge into the house? Like big pots of lavender, big pots of mint?
- o The packaging was beautifully designed and made with care [...] it did make me think of the story of the blue tit bird.
- o Even though we are obviously not nurturing birds, it felt like I was doing the same thing for our home environment.

Figure 6:22 A selection of data from the second adoption experiment regarding the role of functional inspiration and symbolic inspiration in raising awareness

The role of the aesthetic

All participants said the artefacts functioned as artwork/art piece in the home, and almost all made reference to the sensorial nature of the engagement with the artefacts, as the artefacts invited participants to engage not only visually, but also through the sense of touch and smell. This also revealed the uniqueness of this type of artwork, because as participants noticed, it is not only experienced visually, as most artworks in the homes are but also through the sense of touch and smell. The sensorial nature of engagement with the artefacts was seen as 'therapeutic' in that it 'relieved stress' by creating a 'calming' (P 2.2, P 2.3 and P 2.5) and 'relaxing' (P 2.2, P 2.3, P 2.4 and P 2.5) environment due to the colours and shapes utilised, the materials and processes used, and the presence of oils. Thus, the sensorial experience that was created enriched domestic life by promoting wellbeing at home. The slow, and repetitive nature of the interactions with a focus on the action of opening the fragments layer by layer also contributed to increasing the participants' wellbeing. P 2.2's statement 'there was something very nice about the ritual of opening this special little packet and popping it into the pocket' is relevant in this sense. Additionally, because of their aesthetic, the artefacts require thoughtful handling (interaction). One needs to be gentle when opening up the package in which the artefact was delivered, on placing the fragments, attaching the fragments (i.e., tying knots), or removing fragments (i.e., unravelling crochet). These actions also contribute to increasing wellbeing, as they ask one to take care when engaging with the artefact and allow one to slow down, and be mindful. Figure 6:23 contains a selection of excerpts from the second adoption experiment interviews and journals, which aim to capture the experience of each participant.

P 2.1

- o It stimulated so many senses: tactile, visual, and also, olfactory, like aromatherapy [...] there is something really therapeutic but also thoughtful about it. I spend some time with it because of the aroma. I could spend all day with peppermint smell and then there is also the tactility of the paper, and the fabric textile.
- o It was really soothing [...] I got to be invigorated by the peppermint scent and I found that really comforting.
- o I needed to be gentle, and I had to be respectful to it, because it seemed to me that it could be damaged if I wasn't careful.
- o Everything seemed really thoughtful which prompted me to be more thoughtful about it.
- o There is something really beautiful to look at even without all the other portions of it.
- o It was like opening the leaf package allowed myself to be mindful and smell and just be present with it [...] instead of just treating it like a task-oriented from A to B. It was more about what happens between A and B, so I wanted to really experience it, as opposed to just follow the instructions, that is put the leaves in to the slots and have that be done.

P 2.2

- o I wasn't being productive, I wasn't doing work in the evening, but it was nice to feel that I have to slow down, stop carrying about everything else that is going around in my head and just do this one little thing that will make my home feel better.
- o It made it feel calmer, because of the way it looked and that intentional interaction that I had to have.
- o I enjoyed that that act took a little bit of time in the sense that: you chose the one that you wanted (out of the two envelopes) and then you start pulling that thread to unwrap it. It was nice then to match it to the pocket that you felt was the closest in size and shape, and then sometimes having to shimmy it into the pocket, because most often you couldn't just drop it, you had to pop them in side to side. I liked that it was simple but it took a couple of minutes from start to finish.
- o There is something nice about the time you take, you are being made to engage with it for that time period. It is not just spritzing something in the air, or quickly dropping a piece in.
- o It felt like a calming thing in space, with the colors that you used and the choice of materials.
- o There is something about the relax scheduling, the intention of taking care of it and wanting some kind of fragrance in your home, but one that is very quiet, healthier and natural than some other things on the market [...] it felt relaxing.
- o I really enjoyed, the ritual of unwrapping those little pieces [...] that act of slowing down and slowly opening each of these little paper pouches and deciding to put it somewhere and doing that every few days, that felt quite ritualistic to me.

P 2.3

- o It was a wonderful experience involving all senses. Which is unusual. Is always just visual, but this is visual, tactile and olfactory.
- o It was really calm. And I enjoyed the layers, because every time you look at it you discover something else.
- o It emphasized the need for contemplation [...] it will make you calm and relaxed and you have great enjoyment
- o It is a delicate item to open [...] a beautiful piece of textile.
- o It was so beautifully and thoughtfully put together that it made it like a treasure [...] being more careful. Being aware.

P 2.4

- o It kind of brought another element to the piece, not just visual but it was also like using another sense.
- o (Having) things that I enjoy being around really has a huge impact on your life and it improves your mood.
- o I enjoyed physically touching the artefact and I especially liked the aspect of taking off the threads. I thought that was a really great way of engaging with the piece and also make it my own because it developed as I undid the threads. Making it my own in the sense that it will transform at my rate.
- o My favorite part was unraveling the threads and discovering this new layer to the piece.
- o Everything was very nicely put together, and I loved the little envelopes. And the little cards that came inside.

P 2.5

- o I spent a lot of time just touching the materials.
- o I found it so calming [...] I find it very therapeutic, [...] It was definitely a lovely stress relief for me.
- o I loved the packaging. I felt it had a ritual element to it because of all those layers and again, it was made of delicate materials. So, you have to be careful with delicate materials [...] I felt very ritualistic to open the layers one by one.
- o It was also cathartic, ripping something. I don't know if you use a stitch ripper. I use one quite often because I use reclaimed textiles, so I am ripping up old clothes, or whatever I find and I love undoing something as well. There is a part of my head that just loves, not destroying things, but disassembling, with the knowledge that it changes the nature of whatever the object is, that you are taking something away.

P 2.6

- o Having beautiful things in your home makes a difference. I think whether you really noticed it or not, having a really beautiful, not fancy, but a considered visual environment is important.
- o Interacting with it was a pleasant thing. Just to take you out of yourself for a minute, and to suggest 'stop, just have some private interaction', mostly just 'stop for a minute'.
- o (I enjoyed) the meditative quality of it (the experience) [...] I think what was nice was just stopping, just pausing.
- o It was a pleasant interaction, as opposed to washing dishes, or putting things away.
- o I love stuff like that. I find it very therapeutic.

Figure 6:23 A selection of excerpts describing the role of the aesthetic of the artefacts and interactions in the second adoption experiment

The feedback on the design of the artefacts

In regard to the scale and the installation, the participants' responses have indicated that: the scale was appropriate because 'if it was bigger it would be difficult to find a spot for it, and if it was smaller it wouldn't have a presence' (P 2.3), and the installation was 'easy' as it required minimal intervention in the domestic space. In regard to the design of interactions, and the level of skill they demanded there was a consensus that the artefacts were 'easy to engage with' (P 2.2) and the engagement was 'reasonably accessible to a large group of people' (P 2.2). The timing of the engagement was good, but some participants (P 2.2 and P 2.3) suggested it would have been 'nice' to have various options available (for example, less time-consuming activities, more time-consuming activities). One suggestion was to incorporate various levels of interactions by building the interactions further in the packaging (P 2.2). Other recommendations included: having a way to replenish the scents once they evaporate (P 2.1, P 2.3 and P 2.6), and focusing more on actions that involve adding to the wall-hanging as opposed to removing from the wall-hanging (see P 2.5's comment below). There was one technical issue that arose, and that was that the threads got stuck when unravelling the crochet on Artefact 2.5 and Artefact 2.6.

'I also very quickly realized that visually and sensory wise overall I prefer them intact. So, I would have either added to them or left them as is. I performed the activity partly out of curiosity at least the first time, and then after that, I thought 'well, I enjoyed the activity but I think I enjoy more just the layers of it than the activity' P2.5

The feedback on the role of the Adoption Form

The inclusion of the Adoption Form as a tool in the recruitment process has proved to be beneficial, in the sense that it made interested participants aware of their role in the project and the responsibility that comes with it. All participants had the wall-hanging displayed the day they received it or the day after, and they engaged with it repeatedly throughout the two weeks they had the work in their home.

Conclusions of the second adoption experiment

Engaging in the repetitive behaviour, awareness about the bird story (which explained why the artefacts required this type of engagement), and the use in the design of artefacts of loose fragments impregnated with essential oils as replicas of the plant fragments the bird is bringing into its nest, heightened the participants' awareness of the health of their home environment. In addition, the interactive nature of the artefacts made participants think about their artefacts in relation to other objects in the home, and ways in which they could play an active role at home. In that sense, in a subtle way, it enabled them to gain control over their homes. The aesthetic of the artefacts did not play a role in raising awareness, however, the aesthetic of the artefacts and the nature of the interactions continued to play an important role in the engagement with the artefacts, in that it promoted wellbeing at home.

6.2.5 Follow-up interviews with participants from the second adoption experiment

Nine months after the analysis of data from the second adoption experiment was completed follow-up interviews with the participants from the second adoption experiment were conducted. The main

purpose of the follow-up interviews was 'being able to document changes of view or action through repeated collection cycles' (Flick, 2009, p. 138) in order to 'establish the effect of some event on the experimental group which has occurred between the two phases of a survey' (Burns, 2000, p. 569). It consists of collecting observations and measurements through repeated contact with the same individuals over a period of time (Burns, 2000). In this research, the goal of the follow-up interviews was to establish first, if the engagement with the textile artefacts had long-term effects and what are those long-term effect(s), and second, if continuous engagement with the textile artefacts was necessary for the artefacts to maintain their purpose, that is to raise awareness about the health of the home environment with a focus on air quality. Through the process, an interview guide (Figure 6:24) was utilised, made up of questions that were inquiring how the adoption experience was perceived by the participants, what stayed with them throughout the nine months, what is the impact that it might have had on their domestic life (if there is one), how they remembered the artefact and what it was inspired by, and what were the thoughts and actions the adoption experience triggered.

1. How do you remember the experience of having the artefact in your home?
2. Could you please tell me what did you take out of it? Was there anything that stuck with you after returning the artefact?
3. Do you find the experience had meaning? Did it have an impact in any other way apart from what you just mentioned?
4. Are there any things you would change about this experience? Was there anything that you would have wanted to be different?
5. How do you remember the artefact? Can you talk about how it looked and what it did?
6. Do you remember what the artefact was about? If yes, could you please tell me?
7. The artefact was inspired by the nest behaviour of the blue tit female bird that was placing aromatic plants in its nest (as a way to keep their environment healthy). In a similar way, you had to place on/remove from a panel in your home fragments infused with essential oils. What did it mean to you the fact that you were engaged in a behaviour similar to the bird behaviour?
8. Do you think about this (i.e., the fact that you were engaged in a behaviour replicating the bird behavior)?
9. If you remember, could you please tell me what were some of the things that you thought of while having the artefact in your home and soon after returning it?
10. While having the artefact in your home you acquired a new behaviour, of interacting with an object in your home. Did this behaviour extend beyond the time you had the artefact in the home? If yes, in which way?
11. Could you please talk about what engaging in this type of behaviour did for you? Did it make you consider any things in particular that you haven't considered before?
12. In the last nine months, did you develop or changed the way you behave at home?
13. The interactions you engaged in were slow and required one to be rather gentle while handling the artefact. Did you continue interacting in this way with the things in your home environment?
14. During our February interview, you questioned about the role of oils and about the idea of bringing oils/ plants in your home as a way to replicate the bird behavior. Did any of those thoughts take any shape? If yes, what shape? Do essential oils/ plants play a role in your home now? If yes, what is the role?
15. In the last months, did you pay more, less or about the same attention to dust, smells and fumes as before having the artefact in your home? Why do you think is that?
16. If you were to describe (in detail) the experience to someone, how would you describe it?
17. In relation to your everyday life, did it change anything, did it add something?
18. What was your favorite part of the experience?
19. What are the feelings and thoughts it left you with?
20. Is there anything else you might want to add?

Figure 6:24 The second adoption experiment follow-up interview guide

6.2.5.1. Recruitment and procedure

Nine months after the second adoption experiment was completed, the six participants that took part in the second adoption experiment were contacted through email (please see Appendix Q 2) to inquire about their interest and availability in taking part in a second interview in which they would be asked questions about their experience during the second adoption experiment. Attached to the email there was the Participant Information Sheet (please see Appendix N 3) and the Consent Form (please see Appendix O 3). Out of the six participants to the second adoption experiment, five replied and confirmed their interest and availability in taking part in this. P 2.1 was the only participant that did not reply and therefore was not interviewed. Once participants confirmed their availability, a date for the interview was agreed upon. Each participant replied confirming a date and time. All interviews took place between the 27th of November and the 5th of December 2018.

6.2.5.2. Collected data

For transcripts of the interviews please see Appendix R 3.

For interviews data reduction please see Appendix U 3.1, and for interviews data display please see Appendix U 3.2.

6.2.5.3. Qualitative results

The remembered bio-inspired engagement that raises awareness over time

One important finding from the second adoption experiment was that the participants' awareness about the bird behaviour played a central role in raising participants' awareness about air quality. As a result, one aspect investigated in the follow-up interviews was identifying if people still remember the story and if they do what the impact of that memory is. It was found that the memory of the bird's story in relation to its nesting behaviour stayed in the participants' minds over the nine months (Figure 6:25). All participants remembered what the artefact was inspired by, that is the nest behaviour of the blue tit, and the purpose of that behaviour (i.e., 'to make the house safer because of antibacterial properties of the plants', 'to make it fresh and clean', 'to steer off bacteria', 'to refurbish their little nest over time', 'to bring cleansing properties'). Four out of five participants thought of it in relation to their behaviour at home, and thus it informed awareness about that and ways in which they could do for their homes what the blue tit is doing for its nest. For one participant it did not trigger the same kind of thoughts, but they still remembered it. In that sense, P 2.5 started thinking about the qualities (with a focus on the tactile qualities) of the objects that are being brought into the home, as a reflection of the action the bird is performing of bringing plant fragments into its nest.

P 2.2

o It made me think about other ways that people bring some kind of fragrance into their home. [...] I think it's made me notice more the kind of manufactured ways that we bring fragrance into homes, versus the natural. Because I think often, that the more subtle, natural ways, like this project for instance you don't notice it in the same way at all. Which could probably be a strength.

o Being more aware of the beneficial effects that engaging in little ways (such as making a cup tea, lighting a candle) with your space can bring.

o With the very small reward of the ritual of interacting with the artefact, that comfort that it would bring, can also be connected to say 'oh, I am going to wipe up the surface, because it is dusty' because there is that small amount of satisfaction that you get from doing something like that. Even though it is this kind of labour. I think it did make me see how pleasant it can be to have this responsibility, that then makes you feel a little bit good, and that can be transferred onto other tasks that you have to do in the home.

P 2.3

o Having this one little nest that is your home and making sure that is okay. Just try to get rid of all the clutter in your life. And that could be dirt and dust. Making sure it is always clean, and that you have a healthy environment.

o I think I've become more sensitive to being aware of a healthy environment. Not just in my home, but also at work.

o The issue of pollution in the home came up and how to purify it. How to kind of rather than getting rid of chemicals not even start having chemicals in your home. So, using more environmentally friendly products to clean. If at all, I just use baking soda.

o Also, I think I was very grateful, because I thought about where I live, in nature, out in the country.

P 2.4

o Thinking about my own nest [...] the role of nesting and how nesting in your own home affects your health and wellbeing [...] The experience of having your work in my home was positive. That whole two weeks I paid a lot of attention to everything around me. I tried to keep it very clean, so I think that definitely carried on.

o I pay more attention to things piling up, like dust and hair and just generally keeping the floor clean. And, having nice smelling things like natural oils. Things that aren't chemical. That are made beautiful in natural ways not through chemical cleaners, or that improve the space through chemical interaction. I try to buy natural cleaners.

o It made me think about my own space and how I interact with it (and how I interact with the objects in my home), and how I want to see my own space evolve, and my own place in it as well. Because, interacting with objects like these, makes you think about your own place in the cycle of being. My actions have consequences on the things around me and I think that is a big lesson to learn.

P 2.5

o It brought up what do I bring into my home? And what can I do to be more conscious of each thing I bring in? It is going to benefit me? Is it not? Do I actually enjoy this thing that I am bringing into my home and if not why am I doing it? What are the reasons? And maybe if I hadn't, wouldn't that be better. And, also adding things. Maybe there is something that is absent that I should bring in because of the benefits involved.'

P 2.6

o It started me thinking what other things smelled like, it made me notice things like 'the medicine cabinet smells really bad', and certain other things, like ambience smells that I wouldn't notice before, or like what the washing machine smells like.

Things that are not really unpleasant but that normally I wouldn't notice [...] Because of the smell, and because of my need to participate it made me think about it more than I would think about other things in the house.

o I did think about what do you bring in. I know plants, live plants, make oxygen and take away carbon dioxide. So, yes it did make me think about healthy things in the house.

o I think not so much of the bird, more of the bringing clean things into the house. Interested in Norwex products (e.g. microfibre cloths that allow you to clean without cleansers, laundry detergents that aren't polluting and also clean out the inside of your washer, Swiffer-like products that you don't throw away, instead you can wash out).

Figure 6:25 A selection of data from the follow-up interviews reflecting the role of bio-inspiration in raising awareness

The remembered bio-inspired engagement that invites to behaviour change

In the design phase of this research, and in the role the researcher played as a designer the story of the nest behaviour of female blue tit bird was utilised as a technical tool. The goal was to replicate an example of how nature maintains a healthy environment. In this sense the story of the engagement with the artefact was embedded through the interactions which meant to replicate the nest behaviour of the blue tit and through text (i.e., pieces of paper which have the story of the blue tit printed on them were included in every adoption package). For the participants, however, the story of the bird over the nine months became a memory whose role was to initiate new behaviours, to make people act in relation to their home environments. Bruner (1990) argues that the way

people make sense of things is through stories, they acquire meaning through stories and they remember through stories. Bruner (1990) also argues that meaning plays a central role in human action, in other words meaning is what makes people act. Upon an interpretation of the qualitative data acquired during the interviews, it was found that knowing and remembering the story of the bird made participants acquire an understanding of the importance of creating a healthier home. As a result, they went beyond thinking of ways in which they can make their domestic environments healthier, to playing an active role at home by performing actions that made their homes healthier. Four (i.e., P 2.2, P2.3, P2.5, and P2.6) out of five participants expressed one or more ways in which change took place in the home, change that has to do with creating a healthier environment (Figure 6:26).

P 2.2

- o I started using more oils in skincare and I also use them in a diffuser [...] the artefact was starting the ball rolling with more consideration, or awareness about this kind of stuff.
- o Engaging with the space more by doing things that bring comfort (such as making a cup tea, lighting a candle).

P 2.3

- o I actually made changes in my life. I really enjoyed not only the visual but also the sensory aspect of the project, so after I gave the piece back I went and bought some lavender oil and I started out with just having a little dish with a cotton swab and I put some lavender oil on it before I went to bed and placed it on my bedside table. [...] And, just recently I went and bought a diffuser. I also bought something that is called a smoke eater spray with patchouli and lemon essential oils'.

P 2.4

- o I did some reading on oils and how they deter mice, and it turns out peppermint oil deters rodents, so I sprinkled that (peppermint oil) everywhere.
- o I use stuff for own self-care with natural oils.
- o Regularly cleaning my apartment [...] now I notice a lot things that fall on the ground.
- o I engage with the space that I live in quite a bit.

P 2.5

- o I kept the colours in the home because they are calming.
- o I have been handling my surroundings more consciously than before for longer periods of time, than I had before. I spend more time handling my pieces even if it is just my bed as I am making it, or my tables as I am cleaning them, or curtains as I am drawing them closed. I am actually taking the time to feel a little more. Just being conscious of that nexus of touch. I have always used them (essential oils for cleaning), and I have an aromatic diffuser.

P 2.6

- o Bringing good things in the house and not bringing bad things in the house [...] bringing less bad smelling stuff into the house [...] getting new environmental products, and eliminating some cleansers.
- o I am less likely to buy pot flowers, because I see all that pollen coming out and my family when they are at home, they have allergies so I guess I never really thought about it. But now I am thinking like 'oh, is that stuff going to have a bad effect on someone because of the pollen?'

Figure 6:26 Excerpts from the follow-up interviews reflecting the role of storytelling in initiating behaviour

The remembered engagement that empowers

Having an interactive artefact in the home gave participants a sense of control over the type of environment (i.e., calming) they can create, and inspired them to think that they can play an active role in creating this type of environment (P 2.2 was 'thinking about other ways in my life that I can create those kinds of comforts').

The remembered engagement that promotes wellbeing

The way the artefact looked and felt, the scents and the interactions, were among the things that captured participants' attention and made the experience memorable. As a result, they remembered in detail the interaction with the artefact and how the artefact looked, felt, and

smelled. All participants recalled the engagement with the artefacts as calming (Figure 6:27), which was the result of the soft colours, textured surfaces, essential oils, and slow interactions. While one participant (P 2.6) saw it almost like meditation, other participants emphasized the sense of mindfulness that comes as a result of engaging with this type of artefacts.

P 2.2

- o A positive small act that makes you feel calm, engaged, and mindful about taking time.
- o Interacting with the artefact was sort of comforting, noticing how much I enjoy that and then thinking about other ways in my life that I can create those kind of comforts.

P 2.3

- o Is like a ritual you do every day.
- o Made me feel good about my home, about living out in nature.
- o Offered time to stop for a second and just allow yourself some positive time [...] reinforces the need to take the time to relax, to calm down and have a quiet time at some point in your day.
- o Being more mindful. Taking care of my home, and of my environment.

P 2.4

- o Positive experience [...] can have a positive impact on people's home life and their own personal nesting habits.
- o This work was very calming to look at.
- o I think more mindful about my actions at home.

P 2.5

- o It left me with a sense of joy.
- o I pay much more attention to what I bring into my home, specifically with respect to 'do I like the way it feels into my hands?' [...] This compelled and asked maybe to engage in ways, especially with touching that I tend to find uncomfortable and find ways around that blockage, the barrier I put up.
- o I kept the colours because they are calming.

P 2.6

- o Really pleasant [...] If it would have been a bit more involved I guess I could say it would have been a bit like meditation. Something that doesn't have any factual idea that is giving back. It's not growing more leaves like a plant or giving me something to eat like cooking, but that you feel that little by little improved your life, makes your life a little better.'

Figure 6:27 Excerpts from the follow-up interviews reflecting the calming experience

A new type of textile

The idea that a new type of textiles has been created with these artefacts is something that came up during the interview with P 2.6. They acknowledged that while usually domestic textiles are used either for decoration (like an artwork) or a physical use (like a bowl), this one 'it wasn't just a static collectible thing' because while it can be used for decoration also serves a different purpose, of engaging the inhabitants. The artefact was a new type of textile because it had a multisensory dimension, which involved interaction, and because you had to interact with it, it was easy to notice it and appreciate it in a different way than you would notice and appreciate other textiles in the home.

Conclusions of the follow-up interviews

It is argued that the artefacts can function as objects that do not require to be in the home permanently. There is not a need for continuous engagement with the artefacts for the artefacts to raise awareness about air quality. This is because nine months after the second adoption experiment, participants still remembered the story of the bird. As a result, they continued to think of their behaviour at home as a replica of the nest behaviour of the blue tit, and about ways in which they could do for their homes what the blue tit is doing for its nest. Similarly to what I found at the end of the second adoption experiment, the interactive nature of the artefacts made participants feel empowered to contribute to the creation of their home environments. What these follow-up

interviews also revealed was that the memory of the engagement with the artefacts during the two weeks, with an emphasis on the story of the nest behaviour of the blue tit, went beyond making them think that they could act over their home, to inspiring them to act in regard to their home. As a result, they started playing an active role and performed actions that made their homes healthier. The engagement with the artefacts was still perceived as calming and almost meditative, thus contributing to participants' wellbeing. Last, because of the sensorial experience that the engagement with the textile artefacts involves, according to one participant a new type of domestic textile emerged, one that does not play a decorative and static role at home, instead it makes its presence noticed since it requires interaction.

6.3. Comparative analysis between the contemporary designs that raise awareness about air quality and this project

A second way in which the artefacts developed in this research have been evaluated was by comparing them with the contemporary practice on raising awareness about air quality. The comparative analysis had two goals. The first one was to illustrate the uniqueness of the approach developed in the context of this research (which involves bio-inspiration and textiles to raise awareness about domestic air pollution). The second goal was to illustrate the originality of this approach which raises awareness about air pollution while empowering people and promoting wellbeing at home. The criteria established in section 2.3.2, p. 42 of this thesis was used as a tool in this analysis. There, the criteria were a tool that helped to map the contemporary designs that raise awareness about air quality in regard to the shape the project took, the strategy the project used, and the materials and processes the project used. Here, the focus is on analysing the research practice in regard to the strategy, and the materials and processes used. From the point of view of the strategy, the approach utilised in this research (i.e., bio-inspired engagement with textile artefacts) is unique, as the contemporary projects about raising awareness identified through the review of practice, make one aware by visualising air pollution. The distinction between the making invisible visible strategy and the approach involving bio-inspiration is that, while the first one focuses on informing people about the level of air pollution and gives them the role of observers, the strategy of raising awareness through interaction with bio-inspired textile artefacts, does not only not focus on highlighting air pollution as a problem, but provides people with an example of how nature creates a healthy environment and enables them to act due to the interactive nature of the artefacts. In addition, the way raising awareness is achieved in this research (that is as a form of quiet activism through slowly interacting with the artefacts) exists in contrast to the majority of approaches for raising awareness, as most projects that raise awareness are taking place in the public space, as opposed to this one which takes place in the intimate setting of the home. In regard to the materials and processes that were used in the making of the textile artefacts, what was unique was the conceptual role they played as a result of working with bio-inspiration, as opposed to the practical role they play in the making invisible visible strategy. The projects that use textiles as a medium to raise awareness by visualising the levels of air pollution involve working with dye science to either create new dyes (e.g. *PHNX* and *Aerochromics*) or use the chemical properties of traditional dyes (e.g. *Rain Palette*) to reflect levels of air pollution, thus focus on the chemical properties of materials as tools used in the making the invisible visible strategy. In this research, the

raise participants' awareness about air quality at home. The first adoption experiment functioned as a trial, it had three participants, and the findings from this experiment informed the design of artefacts for the second adoption experiment, as well the design of the second adoption experiment. The second adoption experiment had six participants. This chapter ended with a comparative analysis between the practice developed in this research and the contemporary practice that raises awareness about air quality, as a way to emphasise the uniqueness of the approach that emerged in this research.

The procedure for designing and making that was followed in the creation of the three artefacts for the first adoption experiment included: taking inspiration from the biological model at the function level in the form of incorporating in the design of textiles interactions that have ritual-like qualities and that replicate the nest behaviour of the blue tit, and of communicating to the participants the inspiration behind the artefacts (through a print out which describes the bird behaviour and states that the artefact is inspired by that behaviour); and taking inspiration from the biological model at the symbolic level whose aim was to help strengthen in the participant's mind the connection between what they are performing and what the bird is performing. To achieve that, taking inspiration at the symbolic level involved utilising essential oils in the design of artefacts as an extension of the plant fragments the bird is bringing into its nest and using a bio-inspired aesthetic. Lastly, it included taking into consideration the materials and processes utilised in the making of the artefacts. Through an interpretation of the qualitative data collected through interviews and journals, it was found that an awareness of the participants' behaviour as a replica of the bird behaviour (through performing the interactions and remembering the story of the bird), the use of essential oils in the design of artefacts, and the interactive quality of the artefacts, played a role in raising participants' awareness about air quality. The bio-inspired aesthetic did not play a role in that. Nonetheless, it was found that the aesthetic of the artefacts and the nature of interactions seen as slow, and meditative played a positive role, as they increased participants' wellbeing by bringing about a sense of relaxation and by relieving stress. One last finding was that the interaction with the artefacts reminded a participant that they have control over their space, and made them feel empowered to play an active role at home. The first adoption experiment also tested the adoption method itself and the design of artefacts in regard to their scale, installation system, and complexity of interactions. Because the lack of availability of participants generated a limited amount of data, the recruitment process for the second adoption experiment was changed, and clearer instructions about what participating in the adoption experiment meant were introduced. Additionally, the feedback on the scale, installation system, and the nature of interactions from a technical point of view informed the future iterations of the textile artefacts. As a result, the five artefacts created for the second adoption experiment had a scale, and an installation system that made them easier to accommodate in the home; and a refined design of interactions.

Based on the findings from the first adoption experiment, in designing the five artefacts for the second adoption experiment the same procedure that was used to create the artefacts for the first adoption experiment was followed. It was acknowledged though that the role of the bio-inspired aesthetic might not be to raise awareness but to increase participants' wellbeing. The interpretation of the data collected from the six participants confirmed that taking inspiration from the biological model at the function level (which resulted in interactive artefacts, and awareness about the bird story that explained why the artefacts required repetitive interaction), together with the inspiration

at the symbolic level (which informed the use of loose fragments impregnated with essential oils as replicas of the plant fragments the bird is bringing into its nest) increased participants' awareness of the health of their home environment. The analysis also revealed that the aesthetic of the artefacts did not play a role in raising awareness, nevertheless, the aesthetic of the artefacts and the nature of the interactions continued to play an important role in promoting wellbeing at home. Last, it highlighted that the interactive nature of the artefacts made participants think about their artefacts in relation to other objects in the home, and ways in which they could play an active role at home. To these results, the findings from the five follow-up interviews which took place nine months after the second adoption experiment were added. The follow-up interviews were undertaken to identify if there are long-term impacts of the second adoption experiment. The interpretation of the data collected revealed that the artefacts do not require to be in the home permanently. That is because even though nine months have passed since the second adoption experiment, the participants still showed awareness about air quality and thought about ways in which they could do for their homes what the blue tit is doing for its nest. The memory of the nest behaviour of the blue tit played an important role in that. It was also found that participants did not only continue to be aware of their home environments, but they also started playing an active role in constructing a healthy home. This was a result of the engagement with the bio-inspired textile artefacts which empowered them to act. Last, according to one participant a new type of domestic textile emerged, one does not play a decorative and static role at home, instead, it makes the inhabitant notice it since it requires interaction. And that, the engagement with the artefacts was still perceived as calming, mindful and almost meditative, thus contributing to participants' wellbeing.

The comparative analysis between the practice developed in this research and the contemporary practice on air quality highlighted the uniqueness of the approach utilised in this research which involved the development of bio-inspired textile artefacts that raise awareness, artefacts that are also empowering people to play an active role at home and are contributing to their wellbeing. This is unique to the bio-inspired artefacts designed in this research, since the contemporary practice that raises awareness about air quality uses the strategy of making the invisible visible which gives people the role of observers, and also brings with itself a feeling of anxiety, by emphasising the effects of pollution. In addition, it highlighted the shape raising awareness has taken in this research, that is as a form of quiet activism, consisting of performing slow actions in the intimate setting of the home.

The next chapter establishes the guidelines for bio-inspired design that raises awareness about air quality at home, guidelines informed by the qualitative results of the two adoption experiments and the follow-up interviews; tests the guidelines in terms of their applicability in the context of an undergraduate course on bio-inspiration; and discusses *Bio-inspired Awareness*, which integrates the design guidelines and is meant to assist the designers with the process of applying the guidelines.

7. Establish, test, revise and integrate the bio-inspired design guidelines

7.1. Establish the guidelines for bio-inspired design that raises awareness about air quality

The guidelines for designing bio-inspired artefacts that raise awareness about air quality at home and that can be practically applied by designers emerged from the results of the two adoption experiments and the follow-up interviews discussed in the previous chapter. Because the approach to raising awareness that emerged in this research also empowers and relaxes people, the guidelines are constituted of the factors that were identified as playing a role in raising participants' awareness about air quality at home, as well as factors that contribute to increasing participants' wellbeing and make them feel empowered. As a result, guidelines 1 to 3 lead to the creation of an artefact that raises awareness, while guideline 4 leads to the creation of an artefact that empowers people to play an active role at home, and guideline 5 leads to the creation of an artefact that relaxes people and promotes wellbeing at home. Apart from these five guidelines, one last guideline was put forward, guideline 6. This guideline leads to the creation of an artefact that does not pollute the air in the home environment in which it is placed, and it emphasises a particular way of working when developing these type of artefacts. As a result, the six guidelines for bio-inspired design that raise awareness about air quality are as follows:

Take inspiration from the biological model at the function level

Following the steps of the bio-inspired design process, identify an appropriate biological model for the challenge you are addressing, extract the biological principle, transform it into the design principle, and translate the design principle in the design of artefacts. The inspiration can come from the shape, behaviour or process of the biological model you have chosen as inspiration.

Take inspiration from the biological model at the symbolic level

Incorporate in the design of artefacts triggers (i.e., visual elements or physical elements that are associated with the biological model and support the strategy that is being used as inspiration) as a way to strengthen in the mind of the person interacting with the artefact the connection to the biological model. It is important to remember that the elements that you are using in the design of this type of artefact are not meant to improve the air quality of the home environment, instead they are used in a symbolic way.

Communicate the story of the biological model

Introduce in the design of the artefact a way to let people know about the inspiration behind the design (i.e., how the biological model informed the design of the artefact).

Make the artefact interactive

Turn the strategy you are using as inspiration into an interaction. The type of interaction that you should create should be slow and intimate, as a way to generate an experience that allows one to be mindful and reflective in regard to their home environment. Also, the interaction could be similar to small domestic and apparently overlooked practices, that are practical and tangible.

Use a bio-inspired aesthetic that utilises the principles of biophilic design

Take inspiration from the aesthetic of the biological model in the imagery (as reflected in the colours, textures and shapes) and the materials you are utilising in the design of the artefact.

Consider the materials and processes utilised in the making of the artefact

Make conscientious choices about the materials and processes involved in the making of the artefact as a way to create artefacts that are not harmful to the environment. In addition, work in a low-tech manner and a mindful way, and use craft processes that lead to the creation of interactions that are representative of this way of working, that is slow and reflective.

The main purpose of these guidelines is to raise awareness about air quality in the domestic space. The form of raising awareness that is generated is a form of quiet activism that aims at making people mindful about the issue of air pollution at home in a gentle active way, different than the loud and public way in which most projects that raise awareness illustrate. They are aimed at practitioners from various backgrounds, which include, but are not limited to art, craft and design practitioners that when applying the guidelines can choose from a broad range of mediums.

7.2. Test the guidelines for bio-inspired design that raises awareness about air quality

After the guidelines for designing bio-inspired artefacts that raise awareness about air quality have emerged from the adoption experiments, they were tested outside the practice developed in this research in order to identify if they are applicable in design, and how effectively they communicate. This testing took place during an undergraduate course titled *Bio-inspired Artefacts* taught by the researcher at NSCAD University in Halifax, Nova Scotia, Canada. As a way to identify their applicability, attention was paid to how the guidelines manifested in practice, that is how they were applied by the students enrolled in this course, in regard to the type of artefacts for the home that the students created, the range of biological models they used as inspiration, the ways in which the story behind the inspiration was communicated, the type of interactions that emerged, the bio-inspired aesthetic they developed, the materials and processes they used, and their consideration of the materials and processes utilised in the making of the artefacts. Less focus was placed on the quality of execution since students only had three days to make the artefacts. Last, the goal was to identify any challenges that occurred in their application process.

The following explains the course, describes the practical design projects which applied the guidelines, and presents the findings of this evaluation through an interpretation of the students' design projects and the feedback forms.

7.2.1. The *Bio-inspired Artefacts* course

The *Bio-inspired Artefacts* course was open to students from all divisions (i.e., Art, Craft, Design), and had a 3000-level code, which meant students enrolled in this course have completed several introductory level courses as part of their foundation studies, but also in their area of concentration (i.e., Sculpture, Textiles, Product Design). Because the guidelines are intended to be applied by design/craft/art practitioners, it seemed appropriate to test them within a setting which involves emerging design/art/craft practitioners, such as an university classroom setting.

Structure

The course met for 14 times, from Monday May 6th until Wednesday, May 29th, 2019. Each class lasted 4 hours, and each day after class students were required to spend time on homework for next day's class. During the course, the students worked on two projects each time for 6 classes, as class 7 was used for presentation of student projects and group critiques. The two projects were: Project 1 – Bio-inspiration and sustainability and Project 2 – Bio-inspiration and raising awareness. The design guidelines were applied by students via a design brief for Project 2.

Context

The course focused on teaching students how to work with a bio-inspiration approach through the designing and making of two artefacts. Because students had no previous experience working with this process, the goal of Project 1 was to teach students the steps of the bio-inspiration processes and to expose them to the context of bio-inspired design, through class presentations and discussions of bio-inspired design examples. In Project 2 the students were asked to incorporate the guidelines in the design of an artefact. Even though the focus of the two projects was different (i.e., sustainability and raising awareness), what they had in common was the context in which sustainability and raising awareness were achieved, and that was the home. Therefore, Project 1 researched ways to be more sustainable at home (for example, by eliminating the problem of domestic [air, noise, light] pollution), and Project 2 researched ways to raise awareness about air quality at home. In this way, students had some background on the problem of pollution in the domestic space, prior to start working with the design guidelines. When Project 2 was introduced, the design guidelines and examples of designs that raise awareness about a variety of issues, were discussed, but the students were also provided with an overview of air pollution at home, its sources, its causes, and its effects on human health, so that they can start their research on biological models as soon as the project was introduced.

Brief

The design guidelines were applied by students via a design brief for Project 2: Bio-inspiration and raising awareness. The approach to bio-inspiration that was utilised in this project was the challenge to design approach, therefore after introducing the challenge (i.e., design an artefact that raises awareness about air pollution in the home environment utilising the guidelines for bio-inspired design), students were asked to look for ways in nature to tackle the challenge. This needed to happen while having in mind that while raising awareness often takes the form of a group of people attempting to focus the attention of another group of people on some cause or condition, in the context of Project 2, raising awareness needed to take the form of an individual interaction with an artefact that is aimed at making inhabitants pay attention to the health of their home environment, with a focus on air quality. Also, the artefact needed to be accompanied by directions for interacting with it, and a story which described the biological inspiration behind the artefact. Last, the artefacts

needed to be small-scale (50 x 50 x 50 cm maximum), low-complexity, operated by hand, with simple mechanical features, and real-size. For additional information on the structure, context and the design brief please see course outline (Appendix V 1), and project brief (Appendix V 2). The format of this course outline complied with NSCAD University's curriculum requirements and its code of conduct for research ethics.

7.2.2. Recruitment and procedure

The process of recruiting consisted of various steps, and started the second day after the class has ended and after assessment of student work has been completed and grades have been published. At that point each student that was enrolled in the class was contacted through email (please see Appendix V 3) and asked if they were willing to participate in this research, where participating meant having their work for Project 2 (in the form of the digital portfolio) referenced in this study and filling out a feedback form. As a way to make it clear for students what their participation would involve, attached to the email were the Participant Information Sheet (please see Appendix V 4), the Feedback Form, and the Consent Form (please see Appendix V 5). Digital portfolios represent a way for students to auto-document their work. In the classroom, digital portfolios are used as pedagogical tools. Because in a digital portfolio the process of research and making can be easily tracked, they provide a window into how students learn, and they help to improve teaching. In this research, digital portfolios were reviewed as a way to identify how the design guidelines have been applied, by analysing the artefacts that were created from the point of view of the guidelines. Each portfolio was comprised of 5 slides, and included: the scientific research about two biological models that can be used as inspiration in the design process, and more in-depth information about the model they decided to focus on; the design proposal as informed by the design principle extracted from the biological principle; photographs of the making process and written information on materials and processes; photographs of the artefacts they created; photographs showing the interaction with the artefact; and last, the directions for interacting with the artefact and the story of the inspiring model. The feedback forms were a way to gather information in regard to how each student understood and applied the design guidelines. Each feedback form had two sections. The first one was comprised of six questions that students needed to answer to with a ranking from 1 to 5, where 5 meant strongly agree and 1 meant strongly disagree. The second section was comprised of six questions that students could answer to by creating a narrative (Figure 7:1).

PART I: write a number from 1 to 5 after each comment [1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree]		
1	The guidelines were clearly formulated	
2	The guidelines were easy to apply	
3	At the end of the project there was a clear understanding of the guidelines	
4	The project required good knowledge and familiarity with the bio-inspired design process	
5	The project made you consider a way of dealing with challenges that is solution and prevention-based	
6	You have a clear understanding about the role that bio-inspiration can play in raising awareness	
<p>PART II: answer the questions below</p> <ol style="list-style-type: none"> 1. If you were to explain the design guidelines, how would you explain them? 2. What aspect of the instructor's teaching helped you understand and apply the design guidelines? 3. If any, what challenges did you encounter in applying the design guidelines? 4. Do you think there is any additional information that you should have been provided with or any support that you should have been provided with that could have assisted you in the application of the design guidelines? If so, what kind of information/support? 5. Could you please comment on the amount of information about bio-inspiration and the bio-inspired process that is necessary in order to apply the design guidelines? 6. What was the most important thing you learned while working on this project? 		

Figure 7:1 Feedback form comments and questions

Four students confirmed their interest in participating in this research. Once they confirmed their interest and emailed the signed Consent Form to the researcher, they were asked to fill out and email the researcher the Feedback Form. Because as part of their assessment for Project 2 they had to submit their digital portfolios to the researcher when the project was completed, no copies of their digital portfolios were required.

7.2.3. Collected data

For copies of the digital portfolios please see Appendix V 6.

For scans of the completed feedback forms please see Appendix V 7.

7.2.4. Design results

7.2.4.1. The materialisation of guidelines in the students' projects

One way to assess the guidelines was to look at how each guideline was applied in each of the four projects. The goal of this was to identify how the guidelines were understood, if they need to be re-formulated in order for them to be clearer, or if they are difficult to apply, and what is the range of innovation when they are practically applied in the design of an artefact.

The ways in which each projects took inspiration from the biological model at the function level

Regarding taking inspiration from the model at the function level, students started by researching behaviour strategies in regard to: How does nature keep things clean? How does nature keep things

well ventilated? How does nature keep things without chemicals? And how does nature protect from chemical factors and biological factors? They all identified different models in nature to be used as inspiration in their designs (Figure 7:2).

Student	Project created	Biological Inspiration
S 1	Project no. 1 - <i>Shut Eye Stomata Inspired Curtain and Stomata Plant Hanger</i>	Plant Stomata
S 2	Project no. 2 - <i>Peppered Moth Particular Matter Catcher</i>	Moths
S 3	Project no. 3 - <i>Filther Feeder</i>	Salps
S 4	Project no. 4 - <i>Dust Filter for Windows</i>	Baleen Whales

Figure 7:2 The inspiration behind the four projects

The biological model for Project no. 1 was the behaviour of stomata.

'Plant stomata are tiny openings that allow for gas exchange. They can open and close depending on environmental surroundings, therefore completely controlling how much air or water is absorbed into the plant and then back into the air. Stomata is used in photosynthesis to convert CO₂ to H₂O, but can also be used to reduce water loss by closing when conditions are hot or dry. They can open and close as a result of diffusion.' S 1

Inspired by this behaviour, S 1 created an ensemble made out of the *Shut Eye Stomata Inspired Curtain* that mimicked the behaviour of the plant stomata in that it needed to be opened during the day and closed at night similar to the way the plant stomata behaves and the *Stomata Plant Holder* (Figure 7:3) which is a reminder of the role plants play in our lives.



Figure 7:3 Project no. 1 – *Shut Eye Stomata Inspired Curtain and Stomata Plant Hanger* by Student 1
(photo credit S 1, 2019)

The biological model for Project no. 2 was the natural selection process of the peppered moth (*Biston betularia*), a species of Lepidoptera found in the United Kingdom.

‘Before the industrial revolution they (the peppered moths) had primarily white with black speckled wings – camouflaging well with lichen covered trees. As cities and factories sprawled, their woodland habitats became blackened with soot and their primary defense

mechanism became futile. By a process of natural selection and genetic mutation, their pale form (typica) fairly quickly became replaced by an intermediate darkened form (insularia) and then a black form (carbonaria). This process of blackening is called industrial melanism. By 1895 98% of peppered moths were black, though in 1950 Britain passed the clean air legislation addressing pollution which allowed more lichen to flourish. Today there is a diverse range of peppered moth colouring though 70% of peppered moths have returned to their insularia or typica forms.’ S 2

Inspired by this process, S 2 developed the *Peppered Moth Particular Matter Catcher* (Figure 7:4), a collection of moth-like sculptures which attach to the exterior of air vents, and are able to change colour over time by catching evidence of pollution.

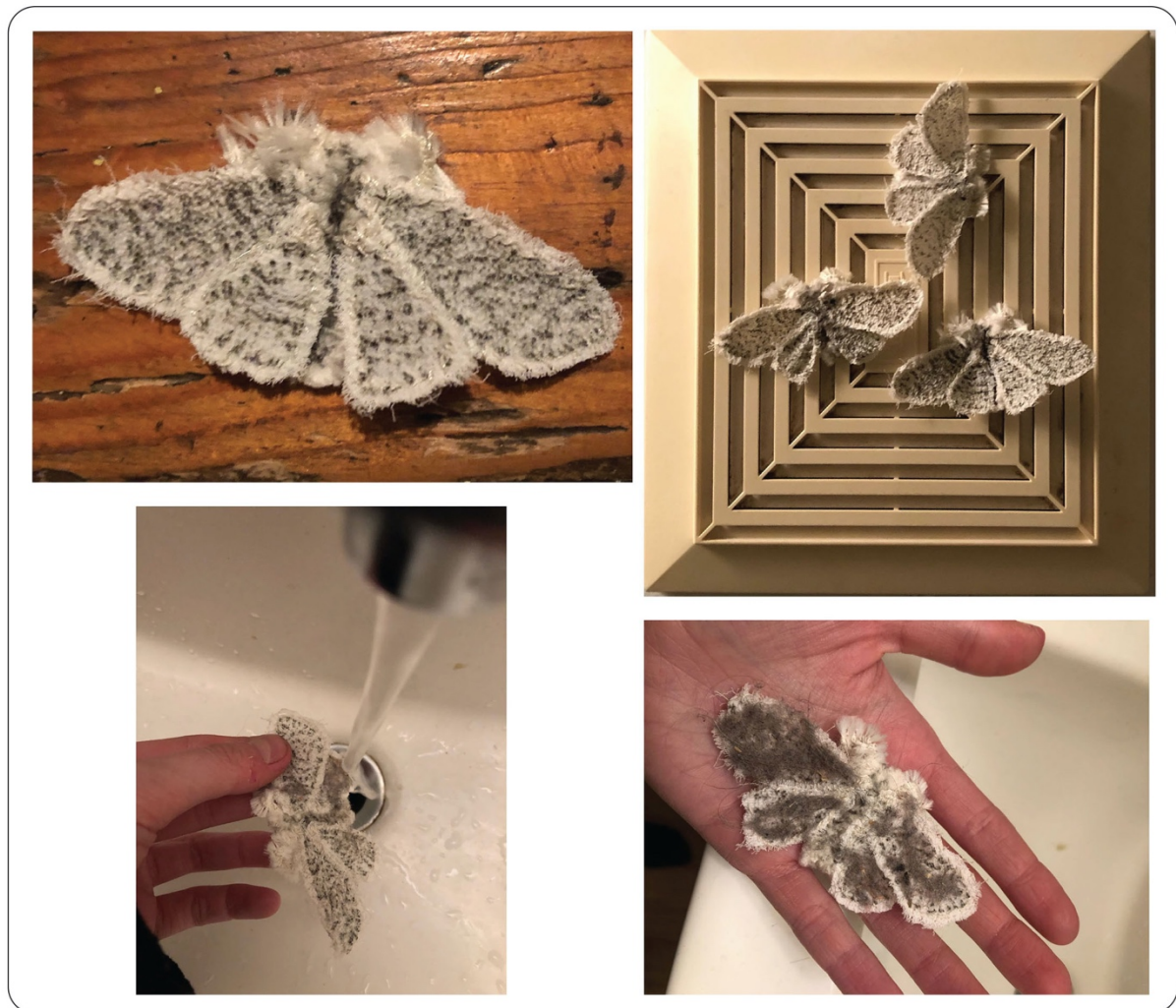


Figure 7:4 Project no. 2 – *Peppered Moth Particular Matter Catcher* by Student 2
(photo credit S 2, 2019)

The biological model for Project no. 3 was the digestive system of salps (*Salpidae*).

‘The marine salp has a feeding mechanism that consists of a mucus-covered net. The salp pulls the water around its body using its muscles, eliminating turbulence and creating a flow equal to a river on a windless day. Both, the mucus covering the net, and the fluid

mechanical conditions inside the salps, can trap particles as small as 0.01 microns, allowing it to survive off the smallest known life-forms.’ S 3

Inspired by this system, S 3 created the *Filther Feeder* (Figure 7:5), a domestic artefact meant to be hung on a door handle and capture dust in a sticky net made of bioplastic similar to the way the digestive system of salps traps food.



Figure 7:5 Project no. 3 – *Filther Feeder* by Student 3
(photo credit S 3, 2019)

The biological model for Project no. 4 was the feeding mechanism of baleen whale (*Mysticeni*).

'Instead of teeth, these whales have dense colonies of bristle-like hairs lining the roof of their mouths. When the whale consumes a mouthful of water, it partially shuts its jaw and uses its tongue to expel the water through the baleen, leaving behind the krill and fish to swallow. [...] The baleen setae reside on baleen plates.' S 4

Inspired by this mechanism, S 4 developed the *Dust Filter for Windows* (Figure 7:6), a collection of eight segments with short and flexible bristles that could be attached to the bottom of windows using Velcro, that are not only meant to trap dust, but also facilitate air flow indoors.



Figure 7:6 Project no. 4 – *Dust Filter for Windows* by Student 4
(photo credit S 4, 2019)

The ways in which each projects took inspiration from the model at the symbolic level

When it came to taking inspiration from the model at the symbolic level, with a focus on the inclusion of triggers in the design of artefact that can strengthen the connection to the biological model, S 1 incorporated live plants in the design of the ensemble, S 2 made use of the properties of materials, that is the texture of the heavy weight polyester which resembles the wings of the moths; S 3 created a bio-plastic that would behave how the net the salps use behaves; and S 4 also made use of the properties of materials, the firmness of the bristles which resembles the bristles the baleen whales have in their mouths.

The ways in which the narrative around the biological model was communicated

Each student put together a short narrative which was meant to accompany the artefact. By looking at these narratives it was found that there seemed to be unclarity in regard to the story and the directions for interacting with the artefacts. While the story was meant to communicate what the

inspiration behind the model is and how the artefact takes inspiration from that model, the directions were meant to describe step by step what people can do as part of the interaction with the artefact. S 3 was the only one that made a clear distinction between the story of the inspiring model and the directions for interacting with the artefact. S 3 also included as part of the narrative a description of the inspiring model, followed by a description of how the artefact replicates the model (Figure 7:7). The stories for the other three projects require editing since they either provide too little information about the biological model and how the artefact was inspired by the model (Project no. 1), or they mixed the information about the directions for interacting with the story about the model and how the inspiration was translated in the design of artefacts (Project no. 2 and Project no. 4).

Salps are ocean-dwelling, jelly-like filter feeders with high filtration rates. As water passes through their cylindrical, hollow bodies, a mucus-covered net traps organisms and even particles smaller than the net's density, such as micro-algae and plankton.

The net, along with the trapped matter, is then digested all together and discharged as pellets.

The salps' mucus-covered net is the main inspiration for the *Filther Feeder*. Just like salps, the *Filther Feeder's* bioplastic net is able to passively trap dust particles when kept moist. The trapped dust will gradually make the transparent net more and more visible, indicating the need for cleaning and dusting the home.

Just like in salps, the net can be reset: after dusting and sweeping, the net can be cut, and a new segment of the net pulled out from the internal chamber.

As the plastic net is made out of cornstarch, it is compostable and water soluble.

Figure 7:7 The narrative for Project no. 3 – *Filther Feeder* by Student 3

The interactive artefacts

The *Shut Eye Stomata Inspired Curtain* is interactive as it requires inhabitants to open it during the day to allow light to come through and for inhabitants to be able to see the plants, and to close it at night, as a way to protect one's privacy. This action accompanied by the presence of plants is aimed at making one aware of the role of plants in maintaining a healthy indoor air. The *Peppered Moth Particular Matter Catcher* requires the inhabitants to carefully attach the moth-like sculptures to air vents by hooking the wired legs onto the vent grille in the home and to leave the moth-like sculpture there until the wings darken and become obstructed with pollutants, thus making invisible dangers apparent to inhabitants. When the moth looks in need of a cleaning, the vent should be cleaned as well. The bio-plastic net of the *Filther Feeder* needs to be kept moist in order to passively trap dust particles, therefore the inhabitants are invited to spray it with water regularly which also allows for a regular examination of the amount of dust that has been trapped on the net. The net, which starts as transparent gradually becomes visible due to the trapped dust, thus indicating the need for dusting and cleaning the home. After cleaning, the grey net can be cut, and a new segment of the net pulled out from the internal chamber of the sculpture. The segments for the *Dust Filter for Windows* not only encourage inhabitants to keep their windows open to promote air flow, but they also help trap potential outdoor pollutants that could come into the home such as pollen and dust. As a way to replicate the role the tongue of the whale plays in the feeding mechanism (it is used to retrieve leftover plankton from the baleen), the inhabitants are to perform regular maintenance of these filters, by using their hands to retrieve the dust particles from the filter. This will let them know what type of dust is being trapped, and as a result inhabitants can take action towards preventing that. Project no. 1 requires inhabitants to close the stomata-like openings of the curtain at night for privacy, while projects no. 2, no. 3, and no. 4 let inhabitants know that it is time to clean,

and makes them to actively do it by having to remove the moths from the vents and wash them, by having to cut the bio-plastic net that turned dark and compost it, and by having to remove the segments from the windows and wash them.

The artefacts with a bio-inspired aesthetic

The colours, patterns and shapes of the biological models inspired not only the imagery and the shape the artefacts took, but also informed the choice of materials. The *Shut Eye Stomata Inspired Curtain* had a floral pattern, and a design that replicated the shape of the stomata, and utilised live plants. The *Peppered Moth Particular Matter Catcher sculptures* resembled the moths in their shape, colours, and textures. For this reason S 2 used heavy weight polyester that has a texture similar to the moths' wings. The *Filther Feeder* is inspired by the colours and translucency of salps, and the design replicated the feeding mechanism of salps through the use of bio-plastic. The bristle-like colonies that line the roof of whales' mouths inspired the design of the *Dust Filter for Windows*.

The consideration of the materials and processes utilised in the making of the artefacts

Most students took into consideration the qualities of the materials and processes utilised, and aimed to create artefacts that do not pollute the air in the environment in which they are placed. S 1 focused on the quality of materials used (i.e., recyclable, bio-degradable). The curtain was made of recycled cotton muslin, recycled mesh, recycled cotton/polyester blend ribbon, and thread; and the plant holder was made of jute rope and cotton rope. The processes used in making these were hand processes including screen-printing, sewing, applique and macramé. S 2 experimented with various fabrics and mark making techniques in order to find the one that would be the least harmful to the environment and would create an accurate rendering of the moths wing pattern. The sculptures were made of heavy weight polyester and light weight polyester printed with transperse dyes, ribbon, thin jewellery wire, and white thread. The processes used were wire manipulation, heat transfer printing, and stitching. S 3 invested in creating their own bio-plastic seen as playing a central role in the interaction. The bio-plastic made out of cornstarch could be composted. The *Filther Feeder's* sculptural form that carried inside the bio-plastic net was made of polyester organza, linen fabric, and linen thread. In addition to the production of bio-plastic, the processes included sewing, and three-dimensional fabric construction. Through their choice of materials, S 4 showed less consideration for the qualities of materials in relation to the issue being tackled. The segments S 4 created were made of plywood, cardboard, plastic broom bristles, Velcro and hot glue, using laser cutting, and assemblage.

Visual summary of students' projects

Figure 7:8 includes a summary of students' projects in regard to each guideline for designing bio-inspired artefacts that raise awareness about air quality.

DESIGN GUIDELINES	Project no. 1 <i>Shut Eye Stomata Inspired Curtain and Plant Hanger</i> by S 1	Project no. 2 <i>Peppered Moth Particular Matter Catcher</i> by S 2	Project no. 3 <i>Filther Feeder</i> by S 3	Project no. 4 <i>Dust Filter for Windows</i> by S 4
Take inspiration from the biological model at the function level	Takes inspiration from the behaviour of the plant stomata in the design of a window curtain that opens and closes in a similar way to the plant stomata.	Takes inspiration from the natural selection process of the <i>Peppered Moth</i> in the design of moth-like objects that attach to air vents and catch particulate matter, changing colour over time.	Takes inspiration from the digestive system of salps in the design of an artefact that attaches to door knobs and captures dust in the same way the digestive system of salps traps food.	Takes inspiration from the feeding mechanism of baleen whale in the design of window filters made of bristles that trap dust in a similar way the baleen whale captures food.
Take inspiration from the biological model at the symbolic level	The artefact uses plants as part of its design.	The artefact uses a particular type of material to recreate the moths' wings.	The artefact uses a bio-plastic net that resembled the net the salps use to trap food.	The artefact uses a particular type of material to recreate the bristles found in the baleen's mouth.
Communicate the story of the biological model	The narrative describes the biological model, but lacks information about how the model inspired the design of the artefact.	The narrative and the directions for interacting with the artefact are blended.	The narrative successfully describes the biological model and how the model inspired the design of the artefact.	The narrative and the directions for interacting with the artefact are blended.
Make the artefact interactive	The interaction involves opening and closing the curtain 'stomata'.	The interaction involves attaching the moth-like objects to the vents and removing them when they change colour in order to wash them.	The interaction involves spraying the bio-plastic net, cutting the bio-plastic net when it changes colour and composting it.	The interaction involves attaching the segments to the bottom of the window frame, and removing the segments from the window frame in order to clean them.
Use a bio-inspired aesthetic that utilises the principles of biophilic design	The colours, shapes, and patterns of the natural flora inspired the design of the curtain.	The colours, shape, pattern and textures of moths inspired the design of the sculptures and informed the choice of materials.	The colours, pattern, and feeding mechanism of salps inspired the design of the sculpture and informed the choice of materials.	The bristle-like colonies that line the roof of whales' mouths inspired the design of the artefact and informed the choice of materials.
Consider the materials and processes utilised in the making of the artefact	The artefact was made of recycled bio-degradable materials.	The artefact was made using low waste processes.	The artefact was made using low tech processes.	There was little consideration for the materials and processes used.

Figure 7:8 Summary of the practical application of guidelines in the four projects

7.2.4.2. Comparative analysis between my practice and students' projects

Another way to assess the guidelines was by looking at the students' projects in comparison to the practice that was developed in this research. The main goal of this comparison was to outline the various results of the practical application of the guidelines in design can yield. In this comparison, the same criteria that were established in section 2.3.2, p. 42, and then reused in section 6.3, p. 154 of this thesis were used, that is, the projects were examined in regard to the shape they took, the strategy for raising awareness they promoted, the materials and processes they used and the effect it can have on the people interacting with them.

From the point of view of the first criterion, the shape the project took, it can be argued that there are a variety of forms these artefacts can take, and according to the students' projects they can range from well-established domestic objects such as curtains to new domestic objects such as window filters, and moth-like or salp-like sculptures. From the point of view of the second criterion, the strategy the project uses to raise awareness, most artefacts were doing so by making the invisible visible. This is the case with Project no. 2, Project no. 3, and Project no. 4, which serve as indicators of pollution. However, in comparison to the majority of contemporary designs that raise awareness using this strategy, these projects not only make inhabitants aware of air pollution, but they also invite the inhabitants to act by letting them know when their home needs cleaning (e.g. Project no. 2, Project no. 3) or make them act (i.e., Project no. 4 is made of segments that are meant to be placed at the bottom of the windows, which means that when using them one needs to have the windows slightly open, therefore allowing for natural ventilation). The third criterion involved looking at the materials and processes used in the making of the artefacts. Here, students had freedom in choosing what medium they wished to work with. Their varied choices of materials suggest that the guidelines are not dependent on using textiles as a medium. Even though projects used materials and processes specific to the discipline of textiles, these are combined with other mediums, and there is also one project (i.e., Project no. 4) that used non-textile materials (e.g. plywood, cardboard, broom bristles, Velcro) and processes (e.g. laser cutting). Beyond being chosen for their physical properties, the materials were chosen for their aesthetic features, and they played a conceptual role in raising awareness, they were used to contribute to solidifying the connection between the model and what the person interacting with the artefact is performing. The fourth criterion was the effect the interaction with the artefact can have on people interacting with them. Except for Project no. 1, which illustrates a positive behaviour that exists in nature and makes one aware by emphasizing the positive role that plants play in maintaining good air quality, the other three projects do not emphasise that instead they function as markers of pollution and make one aware by showing them when the level of pollution has increased.

Figure 7:9 is a visual summary of the students' projects and my practice regarding the four criteria mentioned above.

<i>Bio-inspired Textiles</i> (2014-2019)	CRITERIA FOR ANALYSIS	Project no. 1 <i>Shut Eye Stomata Inspired Curtain and Plant Holder</i> (2019) S 1	Project no. 2 <i>Peppered Moth Particular Matter Catcher</i> (2019) S 2	Project no. 3 <i>Fithier Feeder</i> (2019) S 3	Project no. 4 <i>Dust Filters for Windows</i> (2019) S 4
Product design Domestic textiles (involving textile artefacts [wall-hangings] that one can engage with)	SHAPE the project takes what category does the project belong to? + in what shape does it exist? + what does the project consist of?	Product design Domestic textile (involving a textile artefact [window curtain] that one can engage with)	Product design Domestic sculptures (involving mixed-media sculptures that one can engage with)	Product design Domestic textile sculpture (involving a mixed media sculpture that one can engage with)	Product design Domestic sculptures (involving mixed-media sculptures that one can engage with)
Engaging in a daily bio-inspired ritualistic experience	STRATEGY the project uses to affect audiences how does the project draw the audience's attention?	Engaging in a daily bio-inspired interaction	Offering a visual experience by changing color (becomes darker) in response to the levels of particulate matter in the domestic air	Engaging in a daily bio-inspired interaction and offering a visual experience by changing color (becomes darker) in response to levels of particulate matter in the domestic air	Engaging in a daily bio-inspired interaction
Textile materials (e.g. cotton, linen, silk, wool, banana fibre, pineapple fibre, polyester) and fine art papers (e.g. Arches, pergamena paper); and textile making processes (e.g. screen printing, hand embroidery, crochet, digital printing)	MATERIALS + PROCESSES the project uses for its making what materials and processes are used for the making of the project?	Textile materials (e.g. cotton, synthetic mesh, ribbon, thread) + textile making processes (e.g. screen printing, sewing, applique and macrame)	Textile materials (e.g. lightweight and heavy weight polyester, ribbon, and thread) and wire + processes (e.g. heat transfer/ sublimation printing, wire manipulation, and stitching)	Textile materials (e.g. lightweight polyester organza, linen, and thread) and bio-plastic (made of cornstarch) + processes (e.g. 3D fabric construction, and the production of bio-plastic)	Materials (e.g. plywood, cardboard, broom bristles, Velcro, hot glue) + processes (e.g. laser cutting and glueing)
Illustrates a positive behaviour existent in nature. Promotes well-being by relieving stress.	EFFECTS of the experience on the participants what is the overall experience of interacting with the project?	Illustrates a positive behaviour existent in nature	Illustrates the negative effects of pollution	Illustrates the negative effects of pollution	Illustrates the negative effects of pollution

Figure 7:9 Summary of the analysis of students' projects in comparison to my project

7.2.4.3. Observations in regard to applying the guidelines in an educational setting

In addition to looking into how the guidelines have been applied in the design of artefacts, testing the guidelines in the educational setting also offered the opportunity to identify what students considered to be helpful in the process of applying the guidelines, and what were the challenges.

In regard to the first aspect, there was consensus in the feedback forms that the presentation on the existent practice of design for raising awareness, the group discussion that took place after the presentation, and providing students with feedback at every step of the process helped most with understanding and applying the guidelines. The presentation helped them establish the context for their designs and better understand what design for raising awareness means, while the feedback helped them weave the guidelines with the bio-inspired process, one at a time.

In regard to the second aspect, students encountered several challenges in their application of the design guidelines. The most significant challenge was working with a solution-based approach to design for raising awareness, as it was revealed that there was not enough clarity as to what 'solution' means in the context of design for raising awareness. Students had a hard time understanding what 'function' means and by extension the concept of 'usefulness' in bio-inspired design that raises awareness about air quality. Raising awareness as a strategy to solve modern life challenges is little known, and design practitioners do not place enough emphasis on it. When faced with challenges designers are asked to think of effect-based solutions, instead of cause-based solutions such as raising awareness. As a result, students felt that the function of the artefact should be to improve the home environment, by reducing the levels of pollution. They imagined the artefact needs to clean the air in some way, to diminish the effects of pollution, otherwise, it would not be 'useful'. Therefore, having students understand that the main function of this type of bio-inspired artefacts is to raise awareness, that the artefact is intended to function as a statement piece (similar to an art piece) that makes one think about air quality and possibly sparks conversations about the topic, was a challenge. Another challenge was choosing the appropriate strategy to use as inspiration and extracting the essential from the strategy they decided to focus on. This was due to the wide variety and complexity of solutions from nature, and the language of the scholarly articles on the models they decided to focus on. One last challenge was the quick pace of the course. The course content was the same as the content of a course that is taught during the regular semester time. And while the regular semester lasts three and a half months, this course lasted three and a half weeks. That meant students had to assimilate new information and then apply it faster than they are normally accustomed to.

7.2.5 Conclusions

An interpretation of the data collected in the form of students' projects and feedback forms, with a focus on how each guideline was applied in the students' projects lead to the following discoveries. First, that beyond the nest behaviour of the blue tit, a range of biological models can be used as inspiration, as S 1 used a model that had to do with how nature creates healthy air for humans, S 2 used a model that had to do with how moths have adapted to survive the dangers of air pollution, and S 3 and S 4 used models that offered insight into filtration systems (both as part of feeding

mechanisms). The models offered inspiration either for artefacts that raise awareness by engaging in interactions that mimic the beneficial behaviour of plants (i.e., plant stomata) or for artefacts that worked as a marker of pollution (i.e., moths, salps and whales). Second, it was revealed that when it came to conceptually mimicking the model, most students focused on the materiality of the artefacts that helps them achieve their function. For example, a student created a new material (i.e., bio-plastic) to resemble the material the model is made of. Third, I found that there was unclarity about what the narrative should contain, which means this guideline needs to include further information that communicates what its goal is, such as the role of the narrative is to provide inhabitants with information about the model and to explain how the artefact (as a reflection of the inspiring model) functions, as a way to build meaning around the activity performed. Fourth, it was revealed that due to their interactive nature the artefacts required nurturing, they require frequent attention and care to function. For example, the *Filther Feeder* needs frequent care and attention to fulfill its role, as the participant needs to spray it regularly as a way to keep it moist. In return, it not only makes people aware of an object in their home and creates a visual representation of dust pollution at home, reminding the inhabitants of the importance of periodic dusting and cleaning, but it also invites them to act. It was also revealed that apart from the *Peppered Moth Particular Matter Catcher* all artefacts require daily interactions with the artefacts. In regard to the fifth guideline, because not all projects focused on incorporating a bio-inspired aesthetic, the guideline should provide further information to the participants that explains what the role of a bio-inspired aesthetic is. Sixth, most students made conscientious choices about the materials and processes used in the making of the artefacts. However, because one project did not reflect the consideration of materials used to make the artefact, the guideline should provide information about ways (i.e., use environmentally-neutral materials) in which one can create an artefact that does not pollute the air in the home environment in which it is placed.

The comparison between the contemporary practice and the students' projects highlighted the range of shapes the artefacts which follow the guidelines can take; and revealed that even though three out of the four projects acted as indicators of pollution and used bio-inspiration with the making the invisible visible strategy, the outcomes of this strategy are different than the one contemporary projects use. Because of their interactive nature, the students' projects also ask people to engage, to play an active role, whereas the ones in the contemporary practice assign people the role of observers, and do not provide them with tools to act. Through this comparison it was also found that the application of the guidelines is not dependent on the use of textiles as a medium; and that the tendency, even when working with the bio-inspired approach, is to use making the invisible visible strategy, which emphasises the effects of pollution.

In regard to applying the guidelines in an educational setting, the main recommendation to put forward, that would help facilitate the practical applications of guidelines, would be to introduce the project with a presentation of contemporary example about design that raises awareness with a focus on what function is in design for raising awareness.

7.3. Revise the guidelines for bio-inspired design that raises awareness about air quality

Based on the findings in the previous section, the following additions (highlighted in italics) to the guidelines were made:

Take inspiration from the biological model at the function level

Following the steps of the bio-inspired design process, identify an appropriate biological model for the challenge you are addressing, extract the biological principle, transform it into the design principle, and translate the design principle in the design of artefacts. The inspiration can come from the shape, behaviour or process of the biological model you have chosen as inspiration. *It is important to remember that the function of this type of artefact is not to clean the air in the home environment instead the function of the artefact is to initiate thought in regard to air quality and thus raise people's awareness about air quality.*

Take inspiration from the biological model at the symbolic level

Incorporate in the design of artefacts triggers (i.e., visual elements or physical elements that are associated with the biological model and support the strategy that is being used as inspiration) as a way to strengthen in the mind of the person interacting with the artefact the connection to the biological model. It is important to remember that the elements that you are using in the design of this type of artefact are not meant to improve the air quality of the home environment, instead they are used in a symbolic way.

Communicate the story of the biological model

Introduce in the design of the artefact a way to let people know about the inspiration behind the design (i.e., how the biological model informed the design of the artefact). *This can take the form of a print out which describes the inspiring model and the fact that the artefact mimics that model. This narrative is different than the directions for interacting with the artefact.*

Make the artefact interactive

Turn the strategy you are using as inspiration into an interaction. The type of interaction that you should create should be slow and intimate, as a way to generate an experience that allows one to be mindful and reflective in regard to their home environment. Also, the interaction could be similar to small domestic and apparently overlooked practices, that are practical and tangible.

Use a bio-inspired aesthetic that utilises the principles of biophilic design

Take inspiration from the aesthetic of the biological model in the imagery (as reflected in the colours, textures and shapes) and the materials you are utilising in the design of the artefact. *The natural world inspired aesthetic of the artefact will contribute to bringing a sense of relaxation to the person interacting with it and contribute to their wellbeing. When creating this type of aesthetic, the designer/practitioner should pay attention not only to ways in*

which the aesthetic can engage the visual sense, but also the olfactory sense and the tactile sense, as all these together enhance the wellbeing aspect of the experience.

Consider the materials and processes utilised in the making of the artefact

Make conscientious choices about the materials and processes involved in the making of the artefact as a way to create artefacts that are not harmful to the environment. *For example, utilise environmentally-neutral materials that result in artefacts that do not pollute the air in the home environment in which the artefact is placed.* In addition, work in a low-tech manner and a mindful way, and use craft processes that lead to the creation of interactions that are representative of this way of working, that is slow and reflective.

7.4. Bio-inspired Awareness

After the guidelines for designing bio-inspired artefacts that raise awareness about air quality were tested and revised, they were integrated into the design of a final textile artefact, *Bio-inspired Awareness*. The artefact is made of a textile wall-hanging and loose fragments of paper impregnated with essential oils of lavender (*Lavandula angustifolia*) and peppermint (*Mentha piperita*) accompanied by an instruction manual.

An important teaching tool in practice-based courses are the examples students see of projects similar to what their brief is asking them to do. In the context of the *Bio-inspired Artefacts* course, this was also confirmed by the students through their responses in the feedback forms. This led to the decision to create one final artefact, *Bio-inspired Awareness*, which works as a demonstrator (i.e., it illustrates how the guidelines can be applied in design) that is meant to assist the designers in the practical applications of the guidelines. In this sense, the guidelines are to be accompanied by visual documentation of this physical example of a bio-inspired design that raises awareness about air quality at home. The decision to create this artefact as opposed to using one of the eight artefacts created for the adoption experiments was threefold. First, it had to do with the fact that this artefact needed to be a representation of a product prototype and not a research prototype. In this sense, because the material used in the adoption experiments was designed for research purposes the way the information is presented to a person wanting to have this artefact in their home outside of being part of a study (which is what a designer would be interested in) was changed. In this sense, I decided to create an instruction manual, which not only includes the story of the blue tit bird and the directions for interacting with the artefact, but also information from the Participant Information Sheet. Second, it had to do with wanting to integrate into its design the feedback on the design of the artefacts that I received from the participants of the two adoption experiments, feedback mostly related to the design of interactions. Last, the decision to create this artefact was informed by a desire to further explore with the materials and processes that successfully created a bio-inspired aesthetic as a way to add more complexity and depth to the imagery of the textile wall-hanging and make the artefact resemble a commercial product. While these changes are important, the most important about this textile artefact is that it represents a manifestation of the guidelines for design that raises awareness. In this sense, the artefact is similar to the other eight artefacts created, and therefore (1) takes inspiration from the biological model at the function level, in that it takes inspiration from the nest behaviour of female blue tit bird, and

imitates this behaviour in the design of an artefact comprised of a fabric wall-hanging (Figure 7:10), and paper fragments infused with essential oils of lavender, (Figure 7:11) and peppermint, (Figure 7:12), fragments that participants are to place on the wall-hanging in a similar way to the bird that is placing fragments of aromatic plants into its nest; (2) takes inspiration from the biological model at the symbolic level, as it uses triggers (e.g. essential oils) that support the strategy that is being used as inspiration; (3) includes an instruction manual (Figure 7:13) that incorporates the narrative about the nest behaviour of the blue tit and the directions for interacting with the artefact; (4) is interactive (Figure 7:14); (5) has a bio-inspired aesthetic that incorporates biophilic principles; and (6) takes into consideration the type of materials and processes involved in the making of the artefact as a way to create an artefact that does not pollute the air in the home environment in which it is placed.



Figure 7:10 The wall-hanging part of *Bio-inspired Awareness*



Figure 7:11 The paper fragments infused with essential oil of lavender



Figure 7:12 The paper fragments infused with essential oil of peppermint



Details about the artefact

- It is interactive.
- It is made by hand out of textile materials and using textile processes.
- It incorporates essential oils of lavender and peppermint.
- It comes with a hanging device, but you decide where in the home to place it (ideally, it will be in a place that allows you to be exposed to the artefact often).

Guidelines

- You can interact with the artefact at whatever moment of the day you wish.
- You can interact with the artefact however many times you want.
- Once the essential oils evaporate you can apply more essential on the fragments as a way to continue having the sensorial experience.
- You are invited to take your time, slow down, and contemplate the artefact.

Why bio-inspiration?

In constructing our environment Nature presents us with challenges such as dust, fungi, mould, bacteria and so on. Animals have learnt to effectively deal with such challenges. Blue Tit female birds keep their nest free from biological contaminants by placing in their nest fragments of plants [e.g. daisy (*Helichrysum italicum*), lavender (*Lavandula stoechas*), apple mint (*Mentha suaveolens*), and yarrow (*Achillea ligustica*)] known for their antimicrobial properties. This artefact is inspired by the nest behaviour of the Blue Tit female bird.

How to interact?

Open up one of the envelopes and take out one of the fragments encapsulated between two pieces of pergamena paper. The fragments that are placed in the purple envelope are impregnated with lavender [*Lavandula angustifolia*] essential oil, while the fragments that are placed in the grey envelope are impregnated with peppermint [*Mentha piperita*] essential oil. Pull the end of the thread that has a bead attached to it, and then unravel the crochet until you are able to take the fragment out.

Smell the scent.

Have a look at the shape of your fragment and find its corresponding shape on the panel.

Last, place the fragment in its corresponding pocket on the panel.

repeat these steps for every fragment

Remember, it's about your experience.

Figure 7:13 Instruction manual for *Bio-inspired Awareness*



Figure 7:14 Example of interaction in *Bio-inspired Awareness*

In designing the instruction manual, the goal was to find a way in which the information previously written on small pieces of paper placed in the adoption packages, could be communicated in a manner closer to what designers would create if this was a prototype for a commercial product.

The feedback on the design of the eight artefacts, with a focus on the design of the interactions, had to do with the length of the interactions. In this sense participants mentioned they wished that together with the smaller fragments there were larger fragments that would take longer to unravel, that there were various options available (that would allow for less time-consuming activities, as well as more time-consuming activities), and that the interaction would be further built into the packaging. As a result, for this final artefact, the decision was to place emphasis not only on the part of the interaction that involves the design of the system that allows for the fragment to be placed on the wall-hanging, but also on the part that involves the revealing of the fragment. Whereas with most of the previous artefacts the loose fragments were placed in envelopes or enclosed in between pieces of pergamenata paper stitched together, for this artefact after the loose fragments were hand-painted, and infused with essential oils they were enclosed in between two pieces of pergamenata paper that were held together by crochet stitches that were covering a larger portion of the fragment, and that allowed for a longer interaction time when unravelled. In regard to the strategy for interaction, the decision was to use the pockets strategy, since it is the one that most accurately mimics the nest behaviour of the blue tit, and therefore it would be easy for designers seeing the artefact to understand how the artefact is mimicking the model from a technical point of view. This decision was also aligned with the feedback from the participants which communicated that they prefer the actions that involve adding to the wall-hanging as opposed to removing from the wall-hanging.

The further exploration with the materials that successfully created a bio-inspired aesthetic involved continuing to work with textile materials made of 100% natural bio-degradable fibres (e.g. linen fabric and pineapple fibre fabric, and rayon thread) for the wall-hanging, and fine art Arches paper for the paper fragments; and continuing to use a combination of hand processes (e.g. painting, stitching, paper cutting, and crochet) and digital processes (e.g. digital printing). The processes, however, have been used differently than before. For example, in the process of making the wall-hanging first a painting on Arches paper in gouache paint was created, that was then photographed, and manipulated in Adobe Photoshop, after which it was digitally printed on lightweight 100% linen fabric. Before these processes were used on their own, some pieces were hand-drawn, while other were digitally printed, whereas now these two processes are combined, as a way to create more complex imagery, and to make the artefact resemble a commercial product. The remainder of the process was similar to the process used in other artefacts and involved cutting fragments of pineapple fibre fabric to the shape of the lavender flowers and hand-embroidering them on the linen print, in order to create the pockets in which the paper fragments infused with essential oil of lavender can be placed. The pockets in which the peppermint leaves would be placed were created in a similar way, this time though using digitally printed linen that was hand-embroidered onto pineapple fibre fabric, and then embroidered on the linen print. The process for making the loose fragments involved cutting the lavender flowers and peppermint leaves from the painting in gouache that was used to create the wall-hanging, infusing the fragments with essential oils, and then enclosing them in between two pieces of pergamenata paper by crocheting the pieces together. Deciding to have each of these loose fragments hand-painted also had to do with wanting the artefact to have a finished look.

7.5. Summary of *Establish, test, revise and integrate the bio-inspired design guidelines*

This chapter started with establishing the design guidelines for bio-inspired design that raises awareness about air quality, continued with testing the guidelines in the context of an undergraduate course on bio-inspiration, followed by a revision of the guidelines; and ended with the creation of *Bio-inspired Awareness*, a final textile artefact that integrates the guidelines for bio-inspired design that raises awareness about air quality.

Out of the six guidelines formulated, the first three contributed to raising awareness and required students to create: artefacts inspired by models in nature that are dealing with the issue of pollution, or associated ways to tackle pollution (i.e., filtration systems); artefacts that take inspiration from the biological models at symbolic level (by using triggers), and that are accompanied by a written story describing the inspiration behind the artefact. The next two guidelines required students to create interactive artefacts and to use a bio-inspired aesthetic, and the last guideline was to consider the materials and processes utilised in the making of the artefacts. After the guidelines were established, they were tested during the *Bio-inspired Artefacts* course, a three and half week course taught by the researcher at NSCAD University. An interpretation of the data collected at the end of the course in the form of students' projects and of feedback forms, with a focus on how each guideline was applied in the students' projects lead to a series of discoveries, including: (1) a range of biological models can be used as inspiration for the design of artefact that raise awareness; (2) when it came to conceptually mimicking the model, all students focused on the materiality of the element(s) that helps the artefact achieve its function; (3) there was unclarity about what the narrative should contain, and as a result the guideline was changed as to provide further information about what the narrative should contain; (4) due to their interactive nature the artefacts required frequent attention and care in order to function, which not only makes people aware about an object in their home but also invites them to play an active role at home; (5) because not all projects focused on incorporating a bio-inspired aesthetic, the guideline provided further information about what the role of a bio-inspired aesthetic is; and (6) because not all students were mindful about the impact of materials and processes on the environment, and made conscientious choices about them, the guideline provided further information about practical ways in which artefacts can achieve its purpose of not polluting the air in the environment in which the artefact is placed. In addition, it was found that introducing the project with a presentation of contemporary examples about design that raises awareness is useful and that a clarification of what function is in design for raising awareness is necessary. After analysing the students' projects in regard to each guideline, the students' projects were also analysed by comparing them with the practice developed in this research, in regard to the four criteria established in the second chapter. The most important finding from this analysis was that the guidelines are not dependent on the strategy to raise awareness developed in this research, nor the materials used, as most projects focus on raising awareness by making the invisible visible, by functioning as markers of pollution; and, most artefacts are made of a variety of materials. The last section of this chapter involved discussing *Bio-inspired Awareness*, a final artefact which integrates the guidelines and works as a demonstrator by showing other designers one way in which the guidelines can be materialised in the

design of an artefact. In this sense, visual documentation of this artefact is meant to accompany the design guidelines.

The next chapter presents the conclusions of this research. The chapter starts by presenting a summary of the research, continues with the contribution to knowledge, and ends with discussing possible future research directions.

8. Conclusions

8.1. Summary of research

This research aimed to demonstrate how bio-inspiration in design can inform the creation of artefacts that raise awareness about the health of the home environment with a focus on air quality. The research process started with two reviews that contextualised the research in the area of design for raising awareness and bio-inspired textile design practice, followed by two research stages. In the first stage the researcher adopted the designer role and following a research through design process designed and made textile artefacts that were evaluated through two adoption experiments. In the second stage, informed by the results of the adoption experiments guidelines for bio-inspired design that raises awareness about domestic air quality were established, and then adopting the design facilitator role, the researcher developed and delivered the testing of the guidelines through an undergraduate course on bio-inspiration.

The first contextual review in the second chapter started with a literature review which identified the main causes of air pollution at home, and their effects on human health, but most importantly identified what is the biggest challenge (i.e., mixed exposure) in designing for better air quality at home, and the main recommendation (i.e., reducing exposure) official sources made when dealing with this issue. As a result, it revealed raising awareness as a pragmatic way that can work effectively in preventing the generation of air pollution at home. In addition, it highlighted the form or raising awareness through interactions with textile artefacts as a form of quiet activism, while the discussion on quiet activism established that these subtle interactions with the textile artefacts are a poetic strategy for raising awareness. The practice review which followed the literature review highlighted the lack of designs that raise awareness about indoor air quality, outlined why raising awareness was used as an approach for this research, and evidenced the opportunity to develop this kind of research, and to situate this practice.

The second contextual review in the third chapter discussed the theory and practice of bio-inspiration. The literature review established a distinction between bionics/biomimetics and biomimicry and bio-inspiration which lead to the introduction of a definition of bio-inspiration as using nature as a model to address contemporary challenges, where inspiration from nature is applied in a design-driven creative process. In addition, through the literature review the relation between bio-inspiration and biophilic design was articulated as well as the two levels (functional and symbolic) at which inspiration from nature is taken. This review also allowed to situate bio-inspiration in the field of design that focuses on mimicking nature, and that together with biodesign, bio-integrated design, and biophilic design forms the landscape of the 'bio' related design field. The practice review highlighted the predominant engineering-based approach to bio-inspiration when applied to the creation of textiles and identified the limited number of bio-inspired designs that deal with the issue of air pollution. Through this practice review it was also found that when working with inspiration from nature, most designers use it towards the development of products that lead to the decline, or the elimination of the problem by acting directly on its effects or causes, and, a few use it to speculate about the future. This revealed the uniqueness of the approach utilised in this research, where bio-inspiration is used as a strategy to raise awareness. The chapter concluded with articulating the steps of the bio-inspired process as used in this research, and with identifying the nest behaviour of female blue tit bird as the appropriate biological model to be used as inspiration for practice.

The fourth chapter presented and discussed the methods and tools used throughout this research as well as the theory behind these methods and tools. It established the phases of the research through design process, articulated the role of textile artefacts as cultural/design probes, and organised the methods, tools, and theoretical frameworks for practice into a matrix that was used as a guiding tool throughout this thesis. The chapter discussed prototyping, sampling, adoption, interviews, diary studies, photograph studies, design workshop, and data analysis as methods that helped me reach the main goal and objectives set at the beginning of this thesis, and concluded with emphasising the importance of using reflection and visual mapping as techniques throughout this research.

The fifth chapter discussed the design practice developed in the form of an interactive artefact (i.e., *Home Pharmacy*) and of textile samples. The analysis of *Home Pharmacy* established the procedure for the designing and making of the textile practice and highlighted the role that ritual-like qualities play in the design of the interactions. These findings informed the design brief that functioned as a tool that guided the textile research, which took the form of 46 small-scale samples, six medium-scale samples, and nine large-scale artefacts. This procedure consisted of taking inspiration from the biological model at the function level, assigning ritual-like qualities to the interactions, and taking inspiration from the model at the symbolic level. Where taking inspiration at the function level involved replicating the nest behaviour of the blue tit, taking inspiration at the symbolic level meant using in the design of artefacts elements inspired by the model that could trigger thought in regards to air quality and developing an aesthetic inspired by the model. The aesthetic was not only a reflection of working with bio-inspiration but also with the principles of biophilic design, though the focus that was placed on the imagery developed and the materials used, as well as the stimulation of visual, tactile and olfactory senses. The purpose of these was to communicate the inspiration behind the artefacts, thus triggering thought in regards to the bird behaviour, its reason for this behaviour and how this can be understood in the context of the home. The making process that involved engagement with textile materials and processes, as well as fine art materials and processes, emphasized an intuitive way of making and a consideration of the materials and processes utilised. It also emphasised a poetic way of developing textiles, that is opposed to the high-tech engineering approach which characterises the practice of design that addresses air quality at home. The presentation and discussion of the 46 small-scale samples and the six medium-scale samples at the end of this chapter clarified the role the samples play in this research, that is to allow the creation of a library of material interactions, and the creation of compositions that can inform the design of the interactions and the aesthetic of the textile artefacts used in the evaluation stage of the research.

The sixth chapter discussed the development of eight textile artefacts and their testing through two adoption experiments, and then through comparative analysis with the contemporary practice that raises awareness about air quality. The results of the first adoption experiment, which functioned as a trial and during which three artefacts were tested, suggested that there was potential for the artefacts created following the procedure established in the previous chapter (which involved taking inspiration from the model at the function level as well as symbolic level) to raise awareness about domestic air quality. In this sense, it was revealed that the interactive quality of the artefacts, an awareness of the participants' behaviour as a replica of the bird behaviour, and the use of essential oils in the design of artefacts played a role in raising participants' awareness about air quality. While the bio-inspired aesthetic which incorporated the principles of biophilic design did not play a role in

raising awareness, it did however play an important role in the positive experience that was created; and, together with the slow interactions increased participants' wellbeing by bringing about a sense of relaxation and by relieving stress. One last aspect that was revealed was that the interaction with the artefacts made participants feel empowered to play an active role at home. The results of the second adoption experiment confirmed that taking inspiration from the model at the function level (which resulted in interactive artefacts, and an awareness about the bird story that explained why the artefacts required repetitive interaction) together with taking inspiration from the biological model at the symbolic level (which informed the use of loose fragments impregnated with essential oils as replicas of the plant fragments the bird is bringing into its nest) increased participants' awareness of the health of their home environment; while the aesthetic of the artefacts and the nature of the interactions continued to play an important role in promoting wellbeing at home, and the interactive nature of the artefacts made participants think about the artefacts in relation to other objects in the domestic environment, and ways in which they could play an active role at home. To these results, the results of the follow-up interviews that took place nine months after the second adoption experiment took place, were added. These results showed that a continued awareness about air quality and a subtle change in behaviour (in the form of playing an active role in constructing a healthy home) can be the long-term impacts of the interactions with the artefacts. Last, the evaluation of practice through comparative analysis with the contemporary practice that raises awareness about air quality revealed the uniqueness of the approach utilised in this research, which involves bio-inspiration as a strategy for raising awareness, but also as a strategy that empowers inhabitants and promotes wellbeing at home.

The seventh chapter started with establishing five guidelines for designing bio-inspired artefacts that raise awareness about air quality at home while empowering inhabitants and increasing their wellbeing, and one guideline that asks designers to consider the materials and processes utilised in the making of the artefact as a way to create an artefact that does not pollute the air of the home environment in which it is placed. The six guidelines are as follows:

- Take inspiration from the biological model at the function level
- Take inspiration from the biological model at the symbolic level
- Communicate the story of the biological model
- Make the artefact interactive
- Use a bio-inspired aesthetic that utilises the principles of biophilic design
- Consider the materials and processes utilised in the making of the artefact

After the guidelines were established they were tested through an undergraduate course on bio-inspiration, during which each student had the opportunity to apply the guidelines in the design of one artefact that raised awareness about domestic air quality. An interpretation of the data collected at the end of the course in the form of students' projects and feedback forms, with a focus on how each guideline was applied in the students' projects confirmed their applicability and revealed the range of biological models that can be used as inspiration for the design of artefacts that raise awareness, and of strategies for raising awareness that emerged. These discoveries informed the guidelines further, in that information was added to them as a way to have them communicate the message better. The added information can be seen below highlighted in italics.

Take inspiration from the biological model at the function level

Following the steps of the bio-inspired design process, identify an appropriate biological model for the challenge you are addressing, extract the biological principle, transform it into the design principle, and translate the design principle in the design of artefacts. The inspiration can come from the shape, behaviour or process of the biological model you have chosen as inspiration. It is important to remember that the function of this type of artefact is not to clean the air in the home environment instead the function of the artefact is to initiate thought in regard to air quality and thus raise people's awareness about air quality.

Take inspiration from the biological model at the symbolic level

Incorporate in the design of artefacts triggers (i.e., visual elements or physical elements that are associated with the biological model and support the strategy that is being used as inspiration) as a way to strengthen in the mind of the person interacting with the artefact the connection to the biological model. It is important to remember that the elements that you are using in the design of this type of artefact are not meant to improve the air quality of the home environment, instead they are used in a symbolic way.

Communicate the story of the biological model

Introduce in the design of the artefact a way to let people know about the inspiration behind the design (i.e., how the biological model informed the design of the artefact). This can take the form of a print out which describes the inspiring model and the fact that the artefact mimics that model. This narrative is different than the directions for interacting with the artefact.

Make the artefact interactive

Turn the strategy you are using as inspiration into an interaction. The type of interaction that you should create should be slow and intimate, as a way to generate an experience that allows one to be mindful and reflective in regard to their home environment. Also, the interaction could be similar to small domestic and apparently overlooked practices, that are practical and tangible.

Use a bio-inspired aesthetic that utilises the principles of biophilic design

Take inspiration from the aesthetic of the biological model in the imagery (as reflected in the colours, textures and shapes) and the materials you are utilising in the design of the artefact. The natural world inspired aesthetic of the artefact will contribute to bringing a sense of relaxation to the person interacting with it and contribute to their wellbeing. When creating this type of aesthetic, the designer/practitioner should pay attention not only to ways in which the aesthetic can engage the visual sense, but also the olfactory sense and the tactile sense, as all these together enhance the wellbeing aspect of the experience.

Consider the materials and processes utilised in the making of the artefact

Make conscientious choices about the materials and processes involved in the making of the artefact as a way to create artefacts that are not harmful to the environment. For example, utilise environmentally-neutral materials that result in artefacts that do not pollute the air in the home environment in which the artefact is placed. In addition, work in a low-tech

manner and a mindful way, and use craft processes that lead to the creation of interactions that are representative of this way of working, that is slow and reflective.

In addition to evaluating the students' projects through analysis from the point of view of each guideline, in the seventh chapter the projects were also evaluated through comparative analysis with the practice developed in this research. This revealed that a variety of models can be used as inspiration when working with the design guidelines and that the guidelines are not dependent on the strategy used to raise awareness, nor the materials used, as most projects focus on raising awareness by making the invisible visible (i.e., using biological phenomena as inspiration for designs that serve as indicators of pollution) and most artefacts are made of a variety of materials. This chapter concluded with the creation of *Bio-inspired Awareness*, a final artefact which works as a demonstrator (i.e., illustrates how the guidelines can be applied in design) that is meant to assist the designers in the practical applications of the guidelines for design that raises awareness about air quality at home. In this sense, the guidelines are to be accompanied by visual documentation of this physical example (i.e., *Bio-inspired Awareness*) that integrates the guidelines.

8.2. Contributions of the research

This research brings one major contribution and six minor contributions to knowledge.

8.2.1. Major contribution

The research offers insight into an alternative way (i.e., through raising awareness) in which the problem of domestic air pollution can be tackled, different than the mainstream approach which involves designing and making products that focus on diminishing the effects of pollution. The uniqueness of the approach that emerged through this research lies in that in addition to raising awareness it also empowers people (as it promotes the design of artefacts that are interactive) and it contributes to wellbeing at home (as it promotes the design of artefacts that have a bio-inspired aesthetic). In this research, raising awareness is achieved by using a bio-inspired textile poetic approach, which exists in contrast to the current approaches to raising awareness that focus on making people aware of outdoor air pollution through public interventions and by emphasising the dangers associated with this issue. This poetic way of raising awareness is seen as a form of quiet activism consisting of engagement in interactions that are slow and intimate, and that allow one the time to reflect on the challenge addressed. Even though as it was established in the second chapter, raising awareness about air quality through design projects can make the issue easier to access and available to a large number of people there is a lack of design practice that raises awareness about air quality at home. As a way to address the gap, this thesis brings one key contribution, that is the guidelines for designing bio-inspired artefacts that raise awareness about air quality at home accompanied by visual documentation of a physical artefact that integrates the guidelines and works as a demonstrator helping designers with the process of applying the guidelines (Figure 8:1). This contribution was devised from an unprecedented combination of bio-inspiration, in the form of taking inspiration from nature at the function level as well as symbolic level, and textile design with a focus on the role the aesthetic qualities of the textiles created played.

Because this contribution emerged through putting together bio-inspiration with textile design, most of the new knowledge this research brings is to the field of bio-inspiration and the discipline of textile design.

The guidelines for bio-inspired design that raises awareness about air quality.

Take inspiration from the biological model at the function level

Following the steps of the bio-inspired design process, identify an appropriate biological model for the challenge you are addressing, extract the biological principle, transform it into the design principle, and translate the design principle in the design of artefacts. The inspiration can come from the shape, behaviour or process of the biological model you have chosen as inspiration. It is important to remember that the function of this type of artefact is not to clean the air in the home environment instead the function of the artefact is to initiate thought in regard to air quality and thus raise people's awareness about air quality.

Take inspiration from the biological model at the symbolic level

Incorporate in the design of artefacts triggers (i.e., visual elements or physical elements that are associated with the biological model and support the strategy that is being used as inspiration) as a way to strengthen in the mind of the person interacting with the artefact the connection to the biological model. The elements that you are using in the design of this type of artefact are not meant to improve the air quality of the home environment, instead they are used in a symbolic way.

Communicate the story of the biological model

Introduce in the design of the artefact a way to let people know about the inspiration behind the design (i.e., how the biological model informed the design of the artefact). This can take the form of a print out which describes the inspiring model and the fact that the artefact mimics that model. This narrative is different than the directions for interacting with the artefact.

Make the artefact interactive

Turn the strategy you are using as inspiration into an interaction. The type of interactions that you should create should be slow and intimate, as a way to generate an experience that allows one to be mindful and reflective in regard to their home environment. Also, the interactions should be representative of small domestic and apparently overlooked practices, practical and tangible.

Use a bio-inspired aesthetic that utilises the principles of biophilic design

Take inspiration from the aesthetic of the biological model in the imagery (as reflected in the colours, textures and shapes) and the materials you are utilising in the design of your artefact. The natural world inspired aesthetic of the artefact will contribute to bringing a sense of relaxation to the person interacting with it and contribute to their wellbeing. The main goal of the bio-inspired aesthetic is to play a role in the wellbeing of the people interacting with the artefact. When creating this type of aesthetic, the designer/practitioner should pay attention not only to ways in which the aesthetic can engage the visual sense, but also the olfactory sense and the tactile sense, as all these together enhance the wellbeing aspect of the experience.

Consider the materials and processes utilised in the making of the artefact

Make conscientious choices about the materials and processes involved in the making of the artefact as a way to create artefacts that are not harmful to the environment. For example, utilise environmentally-neutral materials that result in artefacts that do not pollute the air in the home environment in which the artefact is placed. Work in a low-tech manner, mindful way, and use craft processes to create interactions that are slow and that lead to a certain type of interaction.



Details about the artefact

- It is interactive.
- It is made by hand out of textile materials and using textile processes.
- It incorporates essential oils of lavender and peppermint.
- It comes with a hanging device, but you decide where in the home to place it (ideally, it will be in a place that allows you to be exposed to the artefact often).

Guidelines

- You can interact with the artefact at whatever moment of the day you wish.
- You can interact with the artefact however many times you want.
- Once the essential oils evaporate you can apply more essential oil on the fragments as a way to continue having the sensorial experience.
- You are invited to take your time, slow down, and contemplate the artefact.

Why bio-inspiration?

In constructing our environment Nature presents us with challenges such as dust, fungi, mould, bacteria and so on. Animals have learnt to effectively deal with such challenges. Blue Tit female birds keep their nest free from biological contaminants by placing in their nest fragments of plants [e.g., daisy (*Helichrysum Italicum*), lavender (*Lavandula Stoechas*), apple mint (*Mentha Suaveolens*), and yarrow (*Achillea Ligustica*)] known for their antimicrobial properties. This artefact is inspired by the nest behaviour of the Blue Tit female bird.

How to interact?

Open up one of the envelopes and take out one of the fragments encapsulated between two pieces of pergamena paper. The fragments that are placed in the purple envelope are impregnated with lavender [*Lavandula Angustifolia*] essential oil, while the fragments that are placed in the grey envelope are impregnated with peppermint [*Mentha Piperita*] essential oil.

Pull the end of the thread that has a bead attached to it, and then unravel the crochet until you are able to take the fragment out.

Smell the scent.

Have a look at the shape of your fragment and find its corresponding shape on the panel.

Last, place the fragment in its corresponding pocket on the panel.

repeat these steps for every fragment

Remember, it's about your experience.

8:1 Contribution to knowledge in the form of design guidelines accompanied by visual documentation of *Bio-inspired Awareness* artefact

8.2.2. Minor contributions

Regarding the field of bio-inspiration, there are several minor contributions the research brought. The first contribution is brought by how bio-inspiration is being used, that is, as an approach to raise awareness about an issue, which is different than the most common approach to bio-inspiration, that allows the development of improved versions of existing products or new products that lead to the decline, or the elimination of a problem. Here, bio-inspiration is used as a strategy to raise awareness, and in this way, it targets one of the causes of pollution (e.g. passive occupant behaviour). This could not only lead to the reduction of the problem but its elimination, as an active occupant behaviour could mean taking action to remove the causes of domestic air pollution (e.g. the presence in the home of cleaning supplies, of furnishings, etc.). It is important, however, to mention that the research did not investigate if the textile artefacts could change participants' behaviour, instead it focused on raising awareness about air quality. Behaviour change is only mentioned as the motivation for using raising awareness as an appropriate strategy. The second contribution is brought by the idea of taking inspiration from the biological model at the function level and the symbolic level. Where taking inspiration from the model at the function level is the approach the majority of bio-inspired projects use and it implies replicating a shape due to its innate functionality, taking inspiration at the symbolic level implies taking inspiration from the aesthetic of the model and incorporating in the design of artefacts elements that resemble the elements that are part of the mechanism that helps the model achieve its function. This focus on taking inspiration from nature at the symbolic level is an addition to the theory of bio-inspiration that advocates for the taking inspiration from nature with a focus on practical function as a way to find a solution to the problem one is aiming to tackle. The third contribution, is brought by the connection that was created in this research between taking inspiration from nature at the symbolic level and the principles of biophilic design. This thesis does not claim that bio-inspired design is the same as biophilic design, instead it claims that in order to take inspiration from nature at the symbolic level practitioners need to incorporate certain biophilic design principles in the design of artefacts that raise awareness. The fourth contribution is brought to the theory of bio-inspiration. This research provides further clarification on what bio-inspiration is in the context of design inspired by nature. First, it acknowledges that while bionics/biomimetics, biomimicry, and bio-inspiration use nature as a model, bionics/biomimetics use it for engineering-driven innovation, biomimicry uses it for both engineering-driven and design-driven, and bio-inspiration (as defined in this research) uses it for design-driven innovation. Second, it makes the distinction between biomimicry and bio-inspiration, with the latter one not being motivated by sustainability, but by innovation and creativity.

Regarding the discipline of textile design, the minor contribution this research brings is to its practice. In that respect, by exploring ways to apply bio-inspiration in textiles while prioritising their aesthetic qualities, this research proposes a category of bio-inspired textiles different than the bio-inspired engineered textiles which dominate the field. The focus on the aesthetic qualities of textiles came as a result of taking inspiration from nature at the symbolic level in addition to taking inspiration from nature at the function level. The new type of textile that emerged highlights that physical function is not the only one that drives the decision about the making of the textiles, the aesthetic is just as important. Also, with the use of textiles as a medium for design that raises awareness and design that addresses the issue of domestic air, this research fills the gap that existed in practice and that was identified through the contextual review of design for raising awareness.

Last, this research brings a minor contribution to the methodology of cultural/design probes. While cultural/design probes tend to be used in the exploratory stages of research with the goal to collect information that inspires the researchers, here, the textile artefacts were used in the evaluative stage of research, similar to how the electronic probes were used in the Placebo project by Dunne & Raby (2001). However, in contrast to the Placebo project that was a speculative project whose goal was to provoke participants re-think their relation with electronic objects, the primary goal of this research was to test the textile artefacts' function as a form of engagement, and possible agent of change. Whereas the cultural probes are used as agents provocateurs, here, the function of the artefacts as domestic probes is to empower people.

8.3. Possible future research

In terms of possibilities for future development, this research shows potential to be explored further from various perspectives.

One direction could be testing the guidelines for raising awareness with professional designers, as opposed to students, to see the range of applications they can yield. This could involve, first having the guidelines disseminated through an online platform so that they can reach as a larger number of practitioners as possible; second, having practitioners apply the guidelines in the design of an artefact; and third, having them document the artefact they created and posting the visual documentation of the artefact on a public online platform as a way to disseminate the guidelines further. Another direction could focus on applying the guidelines in other disciplines outside textile design, in order to identify to what extent can this approach be used to create artefacts that are made of other materials than textiles. Third, research could focus on investigating how the guidelines can inform the design of artefacts that raise awareness about other challenges than air pollution. One last direction could look into researching the range of behaviours that exist in nature and ways in which these behaviours can inform the design of objects that can contribute to wellbeing at home. Through extension, research would also look into the connection between the health of our planet and human health.

LIST OF REFERENCES

Adorjan, B. & Buchbauer, G. (2010) Biological properties of essential oils: an updated review. *Flavour and fragrance journal*. Vol. 25(6) pp. 407-426.

Allen, J. (2014) The immaterial of materials. In: Karana, E., Pedgley, O. & Rognoli, V., *Materials experience: the fundamentals of materials and design*. Waltham, Massachusetts, USA: Elsevier.

Andrew, S. (2008) Textile semantics: considering a communication-based reading of textiles. *Textile: the Journal of Cloth and Culture*. Vol. 6(1), pp. 32-65.

ARCC (2017) *Better homes, better air, better health report*. [Internet]. Available from: <<https://www.arcc-network.org.uk/wp-content/pdfs/IAQ-action-group-report-Apr2017.pdf>> [Accessed 15 May 2018].

Ask Nature (2017) Life's principles. [Internet]. Available from: <<https://asknature.org/resource/lifes-principles/#:~:text=From%20Biomimicry%203.8%3A,sustained%20over%203.8%20billion%20years.>>> [Accessed 1 July 2017].

Ask Nature (2014) *Plant fragments prevent infections*. [Internet] Available from: <<http://www.asknature.org/strategy/ef93bac26ff8073b3f6f8124c3e2beaa>>. [Accessed 10 December, 2013].

Ask Nature (2013) *How does nature...?* [Internet] Available from: <<https://asknature.org/>>. [Accessed 10 December, 2013].

Baker-Laporte, P., Elliot, E. & Banta, J. (c2008) *Prescription for a healthy house: a practical guide for architects, builders and homeowners*. 3rd rev. ed. Gabriola Island, British Columbia, Canada: New Society Publishers.

Baumeister, D., Smith, J., Tocke, R., Dwyer, J., Ritter, S. & Benyus, J. (2013) *Biomimicry resource handbook: a seed bank of best practices*. Misoula, Montana, USA: Biomimicry 3.8 Create Space Independent Publishing Platform.

Beck, J. (2015) What good is 'raising awareness'? *The Atlantic*. [Internet]. Available from: <<https://www.theatlantic.com/health/archive/2015/04/what-good-is-raising-awareness/391002/>> [Accessed 3 August 2017].

Bell, C. (1992) *Ritual theory. Ritual practice*. New York, New York, USA: Oxford University Press.

Benyus, J. (2002) *Biomimicry: innovation inspired by nature*. New York, New York, USA: HarperCollins Publishers.

Bhushan, B. (2009) Biomimetics: lessons from nature – an overview. *Philosophical Transactions of the Royal Society*. Vol. 367. pp. 1445-1486.

Biokon (2019) *What is bionics?* [Internet]. Available from: <<http://www.biokon.de/en/bionics/what-is-bionics/>>. [Accessed 20 July 2019].

Biomimicry Institute (2019) *What is biomimicry?* [Internet]. Available from: <<https://biomimicry.org/what-is-biomimicry/?>> [Accessed 5 January 2019].

Biomimicry 3.8 (2015) *Biomimicry Design Lens*. [Internet]. Available from: <<https://biomimicry.net/the-buzz/resources/biomimicry-designlens/>> [Accessed 1 March 2015].
Bollas, C. (1987) *The shadow of the object*. New York, New York, USA: Columbia University Press.

Brebenel, E. (2020) Bioinspired textiles that raise awareness about domestic air quality. In: Montagna, G. & Paulo Carvalho Figueiredo, M. C. (eds.), *Textiles, Identity and Innovation: In Touch: Proceedings of the 2nd International Textile Design Conference (D_TEX 2019)*, 19-21 June, Lisbon, Portugal. 1st edition (pp. 297-304). Boca Raton, Florida, USA: CRC Press.

Briggs-Goode, A. & Russell, A. (2011) Printed textile design. In: Briggs-Goode, A. & Townsend, K. (eds.) *Textile design: principles, advances and applications* (p. 105-128). Oxford, England, UK: Woodhead Publishing.

Brown, K. W. & Ryan, R. M. (2003) The benefits of being present: mindfulness and its role in psychological wellbeing. *Journal of Personality and Social Psychology*. Vol. 84, pp. 822-848

Brown, K. W., Ryan, R. M. & Creswell, J. D. (2007) Mindfulness: theoretical foundations and evidence for its salutary effect. *Psychological Inquiry*. Vol. 18(4), pp. 211-237.

Brownell, B. (2014) Manipulating the material code: the transformation of material meaning in contemporary Japanese design. In: Karana, E., Pedgley, O. & Rognoli, V. (eds.), *Materials experience: the fundamentals of materials and design* (pp. 51-62). Waltham, Massachusetts, USA: Elsevier.

Bruner, J. (1990) *Acts of meaning*. Cambridge, Massachusetts, USA: Harvard University Press.

Buchanan, R. (2001) Design research and the new learning. *Design Issues*. Vol. 17(4), pp. 3-23.

Burkeman, O. (2015) When raising awareness backfires. *The Guardian*. [Internet]. Available from: <<https://www.theguardian.com/lifeandstyle/2015/may/22/why-awareness-raising-campaigns-backfire>> [Accessed 5 May 2018].

Burns, R. B. (2000) *Introduction to research methods*. London, England, UK: SAGE.

Caan, S. (2011) *Rethinking design and interiors: human beings in the built environment*. London, England, UK: Laurence King.

Candy, L. (2006) Practice based research: a guide. *Creativity and Cognition Studios Report*. V1.0. Sydney, Australia: University of Technology.

- Candy, L. & Edmonds, E. (2018) Practice-based research in the creative arts. *Leonardo*. Vol. 51 (1), pp. 63-69.
- Carlin, P. (2015) Ritual | Repetition. *Textile: The Journal of Cloth and Culture*. Vol. 13(1) pp. 80-89.
- Celikoglu, O. M., Ogut, S. T. & Krippendorff, K. (2017) How do user stories inspire design? A study of cultural probes. *Design Issues*. Vol. 33 (2) pp. 84-98.
- Cheong, H. & Shu, L. K. (2013) Using templates and mapping strategies to support analogical transfer in biomimetic design. *Design Studies*. Vol.34 (6) pp. 706 -728.
- Clark, L. & Mason, J. R. (1985) Use of nest material as insecticidal and anti-pathogenic agents by European Starling. *Oecologia*. Vol. 67(2) pp. 169-177.
- Climate-ADAPT (2015) *Awareness campaigns for behavioural change*. [Internet] Available from: <<https://climate-adapt.eea.europa.eu/metadata/adaptation-options/awareness-campaigns-for-behavioural-change>>. [Accessed 15 June 2018].
- Coffey, A. & Atkinson, P. (1996) *Making sense of qualitative data*. Thousands Oaks, California, USA: SAGE.
- Creswell, J. W. (2003) *Research design: qualitative, quantitative, and mixed methods approaches*. 2nd ed. London, England, UK: SAGE.
- Diernis, D., Lerstrup, I., Poulsen, D., Stigsdotter, U., Dahlgaard, J. & O'Tool, M. (2019) A systematic review and meta-analysis of nature-based mindfulness: effects of moving mindfulness training into an outdoor natural setting. *International Journal of Environmental Research and Public Health*. Vol. 16, pp. 1-19.
- Dunne, A. & Raby, F. (2001) *Design noir: the secret life of electronic objects*. Basel, Switzerland: Birkhauser; London, England, UK: August Media.
- European Commission Scientific Committee on Health and Environmental Risks (EC SCHER) (2008) *Indoor Air Pollution*. [Internet]. Available from: <http://ec.europa.eu/health/scientific_committees/opinions_layman/en/indoor-air-pollution/index.htm> [Accessed 5 May 2017].
- European Commission Scientific Committee on Health and Environmental Risks (EC SCHER) (2007) *Opinion on risk assessment on indoor air quality*. [Internet]. Available from: <http://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_055.pdf> [Accessed 28 December 2016].
- European Environment Agency (EEA) (2019) *Health impacts of air pollution* [Internet]. Available from: <<https://www.eea.europa.eu/themes/air/health-impacts-of-air-pollution>> [Accessed 20 November 2019].

European Environment Agency (EEA) (2013) *Indoor Air Pollution*. [Internet]. Available from: <<https://www.eea.europa.eu/signals/signals-2013/articles/indoor-air-quality>> [Accessed 20 November 2019].

Fallman, D. (2008) The interaction design research triangle of design practice, design studies, and design exploration. *Design Issues*. Vol. 24(3), pp. 4-18.

Fermanian Business & Economic Institute (2013) *Bioinspiration: an economic progress report*. [Internet] Available from: <<https://drive.google.com/file/d/0B8G4fuB2iZEEX1Mwd0xncVVoSWM/view>>. [Accessed 28 May 2018].

Flick, U. (2009) *An introduction to qualitative research*. London, England, UK: SAGE.

Frayling, C. (1993) Research in art and design. *Royal College of Art Research Papers*. Vol. 1 (1) pp. 1-5.

Gaver, W., Boucher, A., Pennington, S. & Walker, B. (2004) Cultural probes and the value of uncertainty. *Interactions*. September + October. pp. 53-56.

Gaver, W., Dunne, A. & Pacenti, E. (1999) Cultural probes. *Interactions*. January + February. pp. 21-29.

Gillis, K. & Gatersleben, B. (2015) A review of psychological literature on the health and wellbeing benefits of biophilic design. *Buildings*. Vol. 5, pp. 948-963.

Grand, S. & Joan, W. eds. (c2012) *Mapping design research*. Basel, Switzerland: Birkhauser.

Grant, J. & Fox, G. (2007) Understanding the role of the designer in society. *Journal of art & design education*. Vol. 11(1), pp. 88-87.

Gray, C. & Malins, J. (2004) *Visualizing research: a guide to the research process in art and design*. Hants, England, UK: Ashgate Publishing Company.

Gwinner, H. (1997) The function of green plants in nests of European Starlings (*Sturnus Vulgaris*). *Oecologia*. Vol. 134(5/7) pp. 337-352.

Hammell, K. W. (2018) Opportunities for wellbeing: the right for occupational engagement. *Canadian Journal of Occupational Therapy*. [Internet]. Available from: <<https://doi.org/10.1177/0008417417734831>> [Accessed 15 August 2021].

Harkness, J. M. (2002) In appreciation. A lifetime of connections: Otto Herbert Schmitt 1913 – 1998. *Physics in Perspective*. Vol.4, pp. 456-490.

Hekkert, P. & Karana, E. (2014) Designing material experience. In: Karana, E., Pedgley, O. & Rognoli, V. (eds.), *Materials experience: the fundamentals of materials and design* (pp. 3-13). Waltham, Massachusetts, USA: Elsevier.

Helms, M., Vattam S. S. & Goel, A.K. (2009) Biologically inspired design: process and products. *Design Studies*. Vol.30 (5), pp.606 – 622.

Hidalgo, A. K. (2014) Biophilic design, restorative environments and wellbeing. In: Salamanca, J., Desmet, P., Burbano, A., Ludden, G., Maya, J. (eds.), *Proceedings of the Colors of Care: The 9th International Conference on Design & Emotion*, 6-10 October, Bogota, Colombia. Bogota, Colombia: Ediciones Uniandes.

HOK (2013) *Genius of a Biome Report (explores how nature's solutions apply to challenges in built environment)*. [Internet]. Available from: <<https://issuu.com/hoknetwork/docs/geniusofbiome>> [Accessed 7 September 2015].

Houde, S. & Hill, C. (1997) *What do prototypes prototype?* [Internet] Available from: <http://blogs.ischool.berkeley.edu/ict4se/files/2010/09/Prototypes_prototype.pdf>. [Accessed 15 June 2019].

Hunter, D. (2007) *The art of facilitation: the essentials for leading great meetings and creating group synergy*. San Francisco, California: Wiley.

IDEO (2015) *What is social design?* [Internet]. Available from: <<https://youtu.be/QSs397-JF-Q>> [Accessed 15 August 2021].

Iouguina, A., Dawson, J. W., Hallgrimsson, B. & Smart, G. (2016) Biologically informed disciplines: a comparative analysis of bionics, biomimetics, biomimicry, and bioinspiration among others. *International Journal of Design & Nature and Ecodynamics*. Vol. 9(3), pp. 197-205.

Ingold, T. (2013) *Making: anthropology, archeology, art and architecture*. London, England, UK: Routledge.

Ingold, T. (2013) *Ingold – Thinking through Making*. [Internet]. Available from: <<https://www.youtube.com/watch?v=Ygne72-4zyo>> [Accessed 10 September 2017].

Institute of Building Biology + Sustainability (2019) *25 guiding principles of Building Biology*. [Internet] Available from: <<https://buildingbiology.com/principles-of-baubiologie/>>. [Accessed 15 June 2019].

Kabat-Zinn, J. (2003) Mindfulness-based interventions in context: past, present, and future. *Clinical Psychology: Science and Practice*. Vol. 10, pp. 144-156.

Kane, F., Akiwowo, K., Morgan, L. & Tyer, J. (2015) Textile design research: from chemistry to craft towards sustainable design innovation. In: 11th European Academy of Design Conference *The value of design research* 2015. 22 – 24 April. Paris, France. [Internet] Available from:

<https://ead.yasar.edu.tr/wp-content/uploads/2017/02/EAD11_Kane-Akiwowo-Morgan-and-Tyrer-Textile-Design-Research.pdf> [Accessed 15 July 2017].

Kellert, S. R. (1997) *Kinship to mastery: biophilia in human evolution and development*. Washington, D.C., USA: Island Press.

Kellert, S. R., (2005) *Building for life: designing and understanding the human-nature connection*. Washington DC, USA: Island Press.

Kellert, S. R., Heerwagen, J. & Maador, M. (2008) *Biophilic design: the theory, science and practice of bringing buildings to life*. New Jersey, New Jersey, USA: John Wiley & Sons.

Kellert, S. R. & Wilson, E. O. (1993) *The biophilia hypothesis*. Washington, D.C., USA: Island Press.

Koskinen, I., Zimmerman, J., Binder, T., Redstrom, J. & Wensveen, S. (2011) *Design research through practice: from the lab, field and the showroom*. Waltham, Massachusetts, USA: Elsevier.

Kubba, S. (2012) *Handbook of green building design and construction: LEED, BREEAM, and Green Globes*. Oxford, England, UK: Butterworth-Heinemann.

Kvale, S. (2009) *InterViews: learning the craft of qualitative research interviewing*. 2nd ed. Thousand Oaks, California, USA: SAGE.

Lambrechts, M. M. & Dos Santos, A. (2000) Aromatic herbs in Corsican blue tit nests: the 'potpourri hypothesis'. *Acta oecologica*. Vol. 21(3) pp. 175-178.

Laurel, B. (2003) *Design research: methods and perspectives*. Cambridge, Massachusetts, USA: The MIT Press.

Lepora, N. F., Verschure, P. & Prescott, T. J. (2013). The state of the art in biomimetics. *Bioinspiration and Biomimetics*. Vol.8 (1) pp. 1-19.

Lidwell, W., Holden, K. & Butler, J. (2010) *Universal principles of design*. Beverly, Massachusetts, USA: Rockport Publishers.

Lim, Y. K., Stolterman, E. & Tenenberg, J. (2008) The anatomy of prototypes: prototypes as filters, prototypes as manifestations of design ideas. *ACM Transactions on Human-Computer Interactions*. Vol. 15 (2) pp. 7-27.

Lowgren, J. & Stolterman, E. (2007) *Thoughtful interaction design: a design perspective on information technology*. Cambridge, Massachusetts, USA: The MIT Press.

Martin, B. & Hanington, B. (2012) *Universal methods of design: 100 ways to research complex problems, develop innovative ideas and design effective solutions*. Beverly, Massachusetts, USA: Rockport.

- Mason, J. (2002) *Qualitative researching*. 2nd ed. Thousands Oaks, California, USA: SAGE.
- Mattelmaki, T. (2006) *Design probes*. Vaaiakoski, Finland: Gummerus Printing.
- McCullough, M. (1996) *Abstracting craft: the practiced digital hand*. Cambridge, Massachusetts, USA: The MIT Press.
- McDonnell, J., Lloyd, P. & Valkenburg, R. (2004) Developing design expertise through the construction of video stories. *Design Studies*. Vol. 25 (5) pp.509-25.
- McDonough, W. & Braungart, M. (2002) *Cradle-to-Cradle: remaking the way we make things*. 1st ed. New York, New York, USA: North Point Press.
- Mennerat, A. I., Mirleau, P., Blondel, P. & Perr, K. (2009) Aromatic plants in nests of the blue tit *Cyanistes caeruleus* protect chicks from bacteria. *Oecologia*. Vol. 161(4) pp. 849-855.
- Merriam-Webster (2016) *Awareness*. [Internet] Available from: <<https://www.merriam-webster.com/dictionary/awareness>> [Accessed 20 December 2016].
- Merriam-Webster (2016) *Ectoparasite*. [Internet] Available from: <<https://merriam-webster.com/dictionary/ectoparasite>>. [Accessed 20 October 2016].
- Merriam-Webster (2016) *Ritual*. [Internet]. Available from: <<https://merriam-webster.com/dictionary/ritual>> [Accessed 20 May 2016].
- Miles, M. B. & Huberman, A. M. (1994) *Qualitative data analysis*. Thousands Oaks, California, USA: SAGE.
- Moore, S. F. & Myerhoff, B. G. eds. (1977) *Secular Ritual*. Amsterdam, The Netherlands: Van Gorcum.
- Montana-Hoyos, C. & Fiorentino, C. (2016) Bio-utilization, Bioinspiration, and Bio-Affiliation in Design for Sustainability: Biotechnology, Biomimicry, and Biophilic Design. *The International Journal of Designed Objects*. Vol 10(3) pp. 1-18.
- MorrIDGE, B. (2006) *Designing interactions*. Cambridge, Massachusetts, USA: MIT Press.
- Myers, W. (2012) *Bio design: nature + science + creativity*. London, England, UK: Thames and Hudson.
- Muratovski, G. (2016) *Research for designers: a guide to methods and practice*. London, England, UK: SAGE.
- ndeaa NASA (2019) *Biomimetics: biologically-inspired technologies*. [Internet] Available from: <<https://ndeaa.jpl.nasa.gov/nasa-nde/biomimetics/bm-hub.htm>>. [Accessed 15 July 2019].

Newcombe, J. (2019) *Art as barometer: uncovering a new breed of instrumental artist*. [Internet]. Available from: <<http://www.carbonarts.org/articles/art-as-barometer/>> [Accessed 15 July 2019].

Patton, M. Q. (2002) *Qualitative research & evaluation methods*. 3rd ed. Thousand Oaks, California, USA: SAGE.

Pawlyn, M. (2016) *Biomimicry in architecture*. 2nd ed. Newcastle upon Tyne, England, UK: RIBA Publishing.

Pedersen, Z. M. (2009) An architectural love of the living: bio-inspired design in the pursuit of ecological regeneration and psychological wellbeing. In: Brebbia, C.A. (ed.), *Sustainable Development and Planning IV*. Vol. 1, pp. 293-302. Southampton, England, UK: Wessex Institute of Technology.

Peeters, M., Megens, C., Hummels, C. & Brombacher, A. (2013) Experiential probes: probing for emerging behavior patterns in everyday life. In: *Consilience and Innovation in Design 5th International Congress of International Associations of Societies of Design Research: conference proceedings 2013*. 26 – 30 August. Tokyo, Japan. [Internet]. Available from: <https://www.researchgate.net/publication/305043508_Experiential_Probes_probing_for_emerging_behavior_patterns_in_everyday_life> [Accessed 10 August 2019].

Petit, C., Hossaert-McKey, M., Perret, M. & Blo, P. (2002) Blue tits use selected plants and olfaction to maintain an aromatic environment for nestlings. *Ecology letters*. Vol. 5(4) pp. 585-589.

Polites, M. ed. (2019) *The rise of biodesign: contemporary research methodologies for nature-inspired design in China*. Shanghai, China: Tongji University Press.

Pottinger, L. (2017) Planting the seeds of a quiet activism. *Area*. Vol. 49(2) pp. 215-222.

Psychology (2017) *Operationalization*. [Internet]. Available from: <<https://psychology.iresearchnet.com/social-psychology/social-psychology-research-methods/operationalization/>> [Accessed 1 May 2017].

Purtle, J. & Roman, L. A. (2015) Health Awareness Days: Sufficient Evidence to Support the Craze? *American Journal of Public Health*. Vol. 105(4) pp. 1061-1065.

Raut, J. S. & Karuppayil, S. M. (2014) Medicinal Properties of Essential Oils. *Industrial crops and products*. Vol. 62 pp. 250-264.

Robson, C. (2002) *Real world research*. 2nd ed. Oxford, England, UK: Blackwell Publishing.

Rust, C., Mottram, J. & Till, J. (2007) Review of practice-led research in art, design & architecture. U.K., *Arts and Humanities Research Council*. [Internet]. Available from: <<http://shura.shu.ac.uk/7596/>> [Accessed 5 March 2018].

Schon, D. A. (2002) *The reflective practitioner*. Hants, England, UK: Ashgate Publishing Limited.

Shedroff, N. (2001) *Experience Design 1*. Indianapolis, Indiana, USA: New Riders Publishing.

Shove, E., Watson, M., Hand, M. & Ingram, J. (2007) *The design of everyday life*. Oxford, England, UK: Berg

Shu, L. H., Ueda, K., Chiu, I. & Cheong, H. (2011) Biologically inspired design. *CIRP Annals – Manufacturing Technology*. Vol. 60(2) pp. 673-693.

Sorensen, J. (2005) Ritual as action and symbolic expression. In: Ostrem, E., Bruun, M. B., Petersen, N. H. & Fleischer, J. (eds.) *Genre and ritual: the cultural heritage of medieval rituals* (pp. 49-64). Denmark, Copenhagen: Museum Tusculanum Press.

Stappers, P. & Giaccardi, E. (2019) Research through design. In: *The Encyclopedia of Human-Computer Interaction*, 2nd ed. [Internet]. Available from: <<https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/research-through-design>>. [Accessed 10 January 2019].

Stappers, P., Visser, F. S. & Keller, I. (2015) The role of prototypes and frameworks for structuring explorations by research through design. In: Rodgers, P.A. & Yee, J. (eds.) *Routledge companion to design research* (pp. 163-174). New York, New York, USA: Routledge.

Stappers, P. (2013) Prototypes as central vein for knowledge development. In: Valentine, L. (ed.) *Prototype: design and craft in the 21st century* (pp. 85-97). London, England, UK: Bloomsbury.

Stausberg, M. (2006) Reflexivity. In: Kreinath, J., Snoek, J. & Stausberg, M. (eds.) *Theorizing Rituals. Vol. 1: Issues, topics, approaches, concepts* (pp. 627-646). Leiden, The Netherlands: Brill Publishers.

Stephenson, B. (2015) *Ritual: a very short introduction*. New York, New York, USA: Oxford University Press.

Studd, R. (2002) The textile design process. *The Design Journal*. Vol. 5(1) pp. 35-49.

TATE (2020) *Biomorphic*. [Internet]. Available from: <<https://www.tate.org.uk/art/art-terms/b/biomorphic>> [Accessed 20 May 2020].

Ternaux, E. (2012) *Industry of nature: another approach to ecology*. Amsterdam, The Netherlands: Frame.

Terrapin Bright Green (2014) *14 patterns of biophilic design: improving health & wellbeing in the built environment*. [Internet] Available from: <<https://www.terrapinbrightgreen.com/reports/14-patterns/>>. [Accessed 10 June 2019].

Trotto, A. & Cianfanelli, E. (2006) Beyond bionics: a tool for innovation and sustainability. In: Feijs, L.M.G. & Kyffin, S. eds. *2nd Design and semantics of form and movement: proceedings of the 2nd*

DEsForm conference 2006. 26 – 27 October. Eindhoven, The Netherlands. [Internet]. Available from: <<https://www.northumbria.ac.uk/about-us/academic-departments/northumbria-school-of-design/research/desform/previous-conferences-and-proceedings/-/media/corporate-website/documents/pdfs/departments/school-of-design/research/desform/desform-2006-proceedings.ashx>>. [Accessed 15 May 2019].

Turner III, D. W. (2010) Qualitative interview design: a practical guide for novice investigators. *The qualitative report*. Vol. 15(3) pp. 754-760.

UCL (2020) *The Bartlett School of Architecture Bio-integrated Design (BIO-ID) March/MSc*. [Internet]. Available from: <<https://www.ucl.ac.uk/bartlett/architecture/programmes/postgraduate/bio-integrated-design-bio-id-marchmsc>>. [Accessed 30 May 2020].

UK Green Building Council (2016) *Health and wellbeing in homes*. [Internet]. Available from: <<https://www.ukgbc.org/wp-content/uploads/2017/12/Healthy-Homes-Full-Report.pdf>> [Accessed 15 May 2018].

UK Research and Innovation (2017) *Influence of ventilation design on the prevalence of anti-microbial bacteria in homes*. [Internet]. Available from: <<https://gtr.ukri.org/projects?ref=AH%2FR00207X%2F1>>. [Accessed 27 November 2018].

United States Environmental Protection Agency (US EPA) (2019) *Introduction to indoor air quality (IAQ)*. [Internet]. Available from: <<https://www.epa.gov/indoor-air-quality-iaq>> [Accessed 5 December 2019].

Valentine, L. (2011) Craft as a form of mindful inquiry. *The Design Journal*. Vol. 14(3), pp. 283-306.

Vandevenne, D., Pieters, T. & Duflou, J. R. (2016) Enhancing novelty with knowledge-based support for biologically-inspired design. *Design Studies*. Vol. 46, pp. 152-173.

Vincent, J. F. V, Bogatyreva, O. A., Bogatyrev, N. R., Bowyer, A. & Pahl, A. K. (2006) Biomimetics: its practice and theory. *Journal of the Royal Society Interface*. Vol.3 (9), pp.471-482.

Vogel, S. (1998) *Cats Paws and Catapults, Mechanical Worlds of Nature and People*. New York, New York, USA: Northon and Company.

Walker, S. (2017) *Design for life: creating meaning in a distracted world*. New York, New York, USA: Routledge.

Walport, E. (2016) *ARUP thoughts: designing for better indoor air quality*. [Internet]. Available from: <<https://www.csemag.com/articles/arup-thoughts-designing-for-better-indoor-air-quality/>>. [Accessed 20 July 2019].

Web Centre for Social Research Methods (2018) *Hypotheses*. [Internet]. Available from: <<https://socialresearchmethods.net/kb/hypotheses.php>> [Accessed 10 April 2018].

Wensveen, S. & Matthews, B. (2015) Prototypes and prototyping in design research. In: Rodgers, P.A. & Yee, J. (eds.) *Routledge companion to design research* (pp. 262-276). New York, New York, USA: Routledge.

Wheeldon, J. & Faubert, J. (2009) Framing experience: concept maps, mind maps and data collection in qualitative research. *International Journal of Qualitative Methods*. Vol. 8(3) pp. 68-83.

Whitesides, G. M. (2015) Bioinspiration: something for everyone. *Interface Focus*. Vol. 5(4) pp. 1-10.

Wilson, E. O. (1984) *Biophilia*. Cambridge, Massachusetts, USA: Harvard University Press.

Wilson, J. (2000) *Handbook of textile design: principles, processes and practice*. Boca Raton, Florida, USA: CRC Press.

Wimberger, P. H. (1984) The use of green plant materials in bird nests to avoid ectoparasites. *Auk*. Vol. 101 pp. 615-618.

World Health Organisation (WHO) (2011) *Environmental burden of disease associated with inadequate housing*. Copenhagen, Denmark: WHO Regional Office for Europe. [Internet]. Available from: <https://www.euro.who.int/__data/assets/pdf_file/0017/145511/e95004sum.pdf> [Accessed 10 December 2018].

World Health Organisation (WHO) (2010) *WHO Guidelines for indoor air quality: selected pollutants*. Copenhagen, Denmark: WHO Regional Office for Europe. [Internet]. Available from: <http://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf> [Accessed 20 December 2013].

World Health Organisation (WHO) (2009) *WHO Guidelines for indoor air quality: dampness and mold report*. Copenhagen, Denmark: WHO Regional Office for Europe. [Internet]. Available from: <http://www.euro.who.int/__data/assets/pdf_file/0017/43325/E92645.pdf>. [Accessed 20 December 2013].

Zimmerman, J., Stolterman, E. & Forlizzi, J. (2010) An analysis and critique of Research through Design: towards a formalization of a research approach. In: *8th ACM Conference on Designing Interactive Systems: conference proceedings 2010*. 16 – 20 August. Aarhus, Denmark. [Internet] Available from: <https://www.researchgate.net/publication/221441519_An_Analysis_and_Critique_of_Research_through_Design_towards_a_formalization_of_a_research_approach>. [Accessed 15 June 2019].

Zimmerman, J., Forlizzi, J. & Evenson, S. (2007) Research through design as a method for interaction design research in HCI. In: *CHI 2007: conference proceedings 2007*. 28 April – May 3. San Jose, California, USA. [Internet]. Available from: <https://www.researchgate.net/publication/221515150_Research_through_design_as_a_method_for_interaction_design_research_in_HCI> [Accessed 10 August 2019].

Zuo, H., Hope, T. & Jones, M. (2014) Tactile aesthetic of materials and design. In: Karana, E., Pedgley, O. & Rognoli, V. (eds.), *Materials experience: the fundamentals of materials and design* (pp. 27-37). Waltham, Massachusetts, USA: Elsevier.

LIST OF REFERENCES FOR PRACTICE CASE STUDIES

Alive (2013) *Techno Naturology*. [Internet]. Available from: <<http://thisisalive.com/techno-naturology/>> [Accessed 1 November 2015].

Armitage, S. & Ryan, T. (2014) *Catalytic Poetry*. [Internet]. Available from: <<http://www.catalyticpoetry.org/>> [Accessed 30 May 2017].

ARUP (2020) *History*. [Internet]. Available from: <<https://www.arup.com/our-firm/arup-history>> [Accessed 20 May 2020].

Ask Nature (2017) *Shinkansen Train*. [Internet]. Available from: <<https://asknature.org/idea/shinkansen-train/>> [Accessed 1 May 2019].

Ask Nature (2016) *Eastgate Centre*. [Internet]. Available from: <<https://asknature.org/idea/eastgate-centre/>> [Accessed 10 May 2017].

Axis Gallery (2005-2009) *Acid Rain*. [Internet]. Available from: <http://www.axisgallery.com/Axis_Gallery/Bright_Ugochukwu_Eke_Albums/Pages/Acid_Rain,_2005-2009.html> [Accessed 1 October 2019]

Beesley, P. (2013) *Radiant Soil*. [Internet]. Available from: <http://philipbeesleyarchitect.com/sculptures/1218_Radiant-Soil_Paris/index.php> [Accessed 1 October 2019].

Bentel, N. (2016) *Aerochromics*. [Internet]. Available from: <<http://aerochromics.com/>> [Accessed 20 May 2017].

Buckley, C. & Wu, A. (2015) Amid Smog Wave, an Artist Molds a Potent Symbol of Beijing's Pollution. *The New York Times*. [Internet]. Available from: <<https://www.nytimes.com/2015/12/02/world/asia/beijing-smog-air-pollution-artist-brick.html>> [Accessed 20 May 2017].

Cargo Collective (2019) *Biomimicry of the Sun*. [Internet]. Available from: <<https://cargocollective.com/isawthefutureshow/BIOMIMICRY-OF-THE-SUN>> [Accessed 15 June 2019].

Claesson Koivisto Rune (2012) *Sense*. [Internet]. Available from: <<http://www.claessonkoivistorune.se/projects/sense/>> [Accessed 15 June 2019].

Columbia Forest Products (2017) *PureBond*. [Internet]. Available from: <<https://www.columbiaforestproducts.com/library/technical-documents/purebond/>> [Accessed 10 May 2017].

Complex Modelling (2013) *The Rise*. [Internet]. Available from: <<https://www.complexmodelling.dk/?p=690>> [Accessed 1 October 2019].

De Cupere, P. (2013) *Smoke Cloud*. [Internet]. Available from: <http://www.peterdecupere.net/index.php?option=com_content&view=article&id=164:smoke-cloud-in-the-importance-of-being&catid=1:exhibition-news&Itemid=98> [Accessed 20 May 2018].

De Visscher, E. (2019) *Pearling*. [Internet]. Available from: <<https://www.edevisscher.com/pearling.html>> [Accessed 1 October 2019].

Design Boom (2015) *Xiao Zhu uses factory smoke to illustrate dangers of air pollution*. [Internet]. Available from: <<https://www.designboom.com/art/xiao-zhu-air-pollution-project-china-06-11-2015/>> [Accessed 20 May 2017].

Dezeen (2019) *Climate-change data turned into colourful towering totems*. [Internet]. Available from: <<https://www.dezeen.com/2019/07/01/alicja-biala-iwo-borkowicz-totemy-towers-baltyk/>> [Accessed 1 August 2019].

Dunne, A. & Raby, F. (2001) *Placebo project*. [Internet]. Available from: <<http://www.dunneandraby.co.uk/content/projects/70/0>> [Accessed 10 September 2017].

Eadie, L. & Ghosh, T. K. (2011) Biomimicry in textiles: past, present and potential. An overview. *Journal of the Royal Society Interface*. Vol. 8, pp. 761-775.

Eco-Public Art (2010) *Particle Falls*. [Internet]. Available from: <<http://eco-publicart.org/particle-falls/>> [Accessed 15 June 2019].

Feiger, M. (2017) *Humix*. [Internet] Available from: <<https://www.montanamae.com/humix/>> [Accessed 10 March 2018].

Friends of the Earth (2018) *Clean Air Kit*. [Internet]. Available from: <<https://friendsoftheearth.uk/clean-air/clean-air-campaign-order-clean-air-kit>> [Accessed 5 May 2018].

Global Street Art (s.d.) *Dr. Love*. [Internet]. Available from: <<http://globalstreetart.com/images/2hduwfz>> [Accessed 20 May 2017].

Graviky (2017) *Air Ink*. [Internet]. Available from: <<http://www.graviky.com/air-inktrade.html>> [Accessed 25 May 2017].

IKEA (2019) *GUNRID curtain*. [Internet]. Available from: <<https://ikea.today/meet-gunrid-air-purifying-curtain/>> [Accessed 15 August 2019].

Imhof, B. & Gruber, P. eds. (2013) *Biornametics: what is the architect doing in the jungle?* Vienna, Austria: Springer-Verlag.

In the Air (2008) *In the Air*. [Internet]. Available from: <<http://www.intheair.es/>> [Accessed 15 August 2019].

Inhabitat (2014) *Andrea*. [Internet]. Available from: <<https://inhabitat.com/video-andrea-air-purifier-uses-a-plant-to-clean-the-air-in-your-home/>> [Accessed 15 May 2017].

Interface (2019) *Entropy*. [Internet]. Available from: <<https://www.interface.com/CA/en-CA/detail/entropy-metamorphosis-1178005999G15S001>> [Accessed 17 June 2019].

Jaramillo Arango, J. (2018) Esmog Data: interpreting air quality through media art and design. *Leonardo*. Vol. 51 (2) pp. 183-183.

Kapsali, V. (2016) *Biomimicry for designers: applying nature's processes and materials in the real world*. London, England, UK: Thames and Hudson.

Loop.PH (2016) *Velo2*. [Internet]. Available from: <<http://loop.ph/portfolio/velo2/>> [Accessed 30 May 2017].

Material District (2007) *Climatex Lifecycle*. [Internet]. Available from: <<https://materialdistrict.com/material/climatex-lifecycle/>>. [Accessed 15 October 2019]

Molekule (2017) *Molekule*. [Internet]. Available from: <<https://molekule.com>> [Accessed 15 May 2017].

Munoz, L. (2016) *Delhi Lung*. [Internet] Available from: <<http://www.lucasmunoz.com/site/project/php?id=399>> [Accessed 15 May 2017].

Museum of London (2017) *Fuming pot of green and yellow glaze: 16th – 17th century*. [Internet]. Available from: <http://www.museumoflondonimages.com/image_details.php?image_id=65587> [Accessed 5 June 2017].

Nanotex (2017) *Aquapel*. [Internet]. Available from: <<http://nanotex.com/aquapel/>> [Accessed 10 May 2017].

Norguet, P. (2010) *Plain Air*. [Internet]. Available from: <<https://www.patricknorguet.com/en/project/plain-air>> [Accessed 15 June 2019].

Papier D'Armenie (2017) *Papier D'Armenie*. [Internet]. Available from: <<http://www.papierdarmenie/fr/shop/en/>> [Accessed 5 June 2017].

Pax Water (2019) *Active Mixers / Biomimicry*. [Internet]. Available from: <<http://www.paxwater.com/biomimicry>> [Accessed 15 October 2019].

- Pinsky, M. (2018) *Pollution Pods*. [Internet]. Available from: <<http://www.michaelpinsky.com/project/pollution-pods/>> [Accessed 5 May 2018].
- Posavec, S. (2015) *Touching Air*. [Internet]. Available from: <<http://www.stefanieposavec.com/airtransformed/>> [Accessed 25 May 2017].
- Pu Yan, V. (2017) *Pure*. [Internet]. Available from: <<https://www.victorpuyan.com/purifier>> [Accessed 15 June 2019].
- Quinn, B. (2013) *Textile visionaries: innovation and sustainability in textile design*. London, England, UK: Laurence King Publishing.
- Rahm, P. (2009) *Deterritorialized Milieus*. [Internet]. Available from: <<http://www.philipperahm.com/data/projects/deterritorializedmilieus/index.html>> [Accessed 15 June 2019].
- Railway Technology (2019) *Talgo 350 very high speed trains*. [Internet]. Available from: <<https://www.railway-technology.com/projects/talgo-train-very-high-speed-spain/>> [Accessed 1 October 2019].
- Requena, G. (2015) *Light Creature*. [Internet]. Available from: <<https://gutorequena.com/light-creature/>> [Accessed 15 May 2017].
- Scott, J. (2012) Knitting Moves: bio-inspired transformable textiles for knitted architecture. *Studies in Material Thinking*. Vol. 7. [Internet]. Available from: <http://www.materialthinking.org/sites/default/files/papers/SMT_V7_P8_Scott.pdf> [Accessed 21 February 2014].
- Stomatex (2004) *Stomatex: multi dimensional fabric technology*. [Internet]. Available from: <<http://www.stomatex.com/neoprene-fabrics-material-supplier.html>> [Accessed 10 October 2019]
- Studio Roosegaarde (2017) *Smog Free Ring*. [Internet]. Available from: <<https://www.studioroosegaarde.net/project/smog-free-ring>> [Accessed 1 June 2019].
- Stueck, A. (2017) *Herbal Textiles*. [Internet]. Available from: <<http://alexandrastueck.com/HERBAL-TEXTILES>> [Accessed 10 June 2017].
- Sun, D. (2014) *Rain Palette*. [Internet]. Available from: <<https://www.sundahea.com/rain-palette>> [Accessed 15 May 2017].
- Tarkett (2019) *DESSO AirMaster*. [Internet]. Available from: <https://professionals.tarkett.com/en_EU/node/desso-airmaster-5076>. [Accessed 17 May 2017].
- The Centre for Genomic Gastronomy (2011) *Smog Tasting*. [Internet]. Available from: <<http://genomicgastronomy.com/work/2011-2/smog-tasting/>> [Accessed 15 June 2019].

The Unseen (2013) *PHNX*. [Internet]. Available from: <<http://seetheunseen.co.uk/phnx/>> [Accessed 20 May 2017].

UAL Research Online (2018). *Air Pollution Toile*. [Internet]. Available from: <<http://ualresearchonline.arts.ac.uk/13410/>> [Accessed 15 March 2019].

University of Cambridge Research (2013) *Flexible Opals*. [Internet]. Available from: <<https://www.cam.ac.uk/research/news/flexible-opals>> [Accessed 10 October 2019].

UTEC (2014) *UTEC surprises again with a billboard that purifies air*. [Internet]. Available from: <<https://www.utec.edu.pe/en/news/utec-surprises-again-billboard-purifies-air>> [Accessed 1 August 2019].

Woke Studios (2017) *TZOA wearable environment tracker*. [Internet] Available from: <<https://www.tzoa.com/>> [Accessed 20 May 2017].

Xin, H. (2017) *Smog Shades*. [Internet]. Available from: <<https://www.huachenxin.com/>> [Accessed 20 February 2018].

GLOSSARY

Adoption experiment

The process used for the testing of the textile artefacts, which includes: installing the artefact in the home for a pre-determined period of time (here, two-weeks), interacting with the artefact during that time, recording their interaction with the artefacts in a journal, and being interviewed at the end of that pre-determined period. This process is inspired by the method Dunne & Raby (2001) used in their Placebo project, in order to test eight objects that were designed to elicit stories about the secret life of electronic objects. In order to achieve that, the objects were placed in people's homes for a certain period of time, people were asked to pay attention to them during the time they had them in the home, and at the end of that period, people were interviewed.

Adoption package

In this research, the adoption package functions as a domestic probe. The adoption package is the package that is given to the participants of the adoption experiments, that consists of the textile wall-hanging (ready to be installed in the home, that is it includes dowel rods with screw eyes and pins), the loose fragments of fabric and/or paper infused with essential oils of lavender and/or peppermint, a print out with the story of the bird, directions about interacting with the artefact and a journal to record their interactions.

Adoption period

The two-week period during which the adoption package was in the participant's home, during which the participant was invited to install the artefact, interact with it, and record the interactions in a journal provided.

Aesthetic

Refers to how something (here, the textile artefacts) looks, feels (at touch), and smells.

Aesthetic qualities of artefacts

Refers to what the inhabitant is seeing, feeling (by touching), and smelling when interacting with the textile artefacts.

Appearance

Refers to how something (here, the textile artefacts) looks.

Domestic (cultural/design) probes

In this research, the adoption package functions as a domestic probe. Because the artefacts are a central part of the adoption package (i.e., domestic probe), the artefacts are referred to as domestic probes.

In its role as a domestic probe, the objects in the package are intended to be placed into participants' homes and engage participants in interactions, that are then recorded by the participants. Domestic probes are a sub-category of cultural/design probes.

Ritual qualities of interactions

The features that give the interaction with textile artefacts ritual-like qualities (i.e., the repetitive nature of interactions, their performance according to a prescribed set of rules, and their timing).

Textile samples

The small-scale and medium-scale textiles that have been created after *Home Pharmacy* and before the textile artefacts. These samples consist of a background panel and a limited number of loose fragments that can be attached to/ removed from the background panel.

Textile artefacts

The large-scale textiles which took the form of textile wall-hangings accompanied by loose fragments of fabric and/or paper impregnated with essential oils of lavender and peppermint.

The textile artefacts play the role of prototypes/ research instruments. As a central part of the adoption package (i.e., domestic probe), the artefacts are referred to throughout this research as domestic probes.

Textile wall-hanging

The part of the artefact (made of fabric and/or paper) that goes on the wall and on which loose fragments could be added to, or from which loose fragments could be removed.

Textile background panel

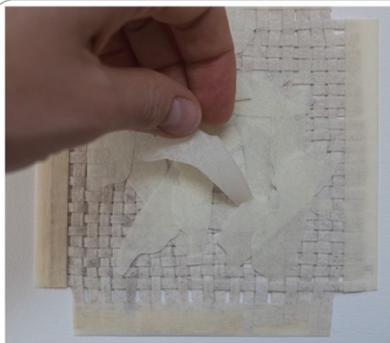
The part of the sample (made of fabric and/or paper) on which loose fragments could be added, or from which loose fragments could be removed.

Textile loose fragments

The part of the artefact (made of fabric and/or paper that is impregnated with essential oils) that either comes in envelopes that need to be opened up and added to the textile wall-hanging or is already attached to the textile wall-hanging and needs to be removed from it.

Appendix A – Small-Scale Samples in set no. 1

A 1 Sample 1.1



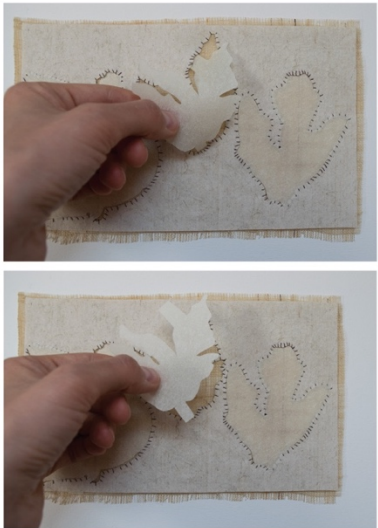
Set no. 1	Sample no. 1	
Action	adding removing	
Strategy	cutouts of paper	
Interaction	the loose fragments can be placed wherever the inhabitant desires. Thus, the inhabitant acts as a designer, being able to create their own composition.	
Dimensions	12cm x 13 cm	
Materials	background: linen paper, masking tape loose fragments: pergamenata paper	
Techniques	hand weaving and paper cutouts	

A 2 Sample 1.2



Set no. 1	Sample no. 2	
Action	adding removing	
Strategy	cutouts of paper	
Interaction	the loose fragments need to be placed in their corresponding spots on the background. The design of each loose fragment includes 'legs' that allows the fragment to be attached to the background.	
Dimensions	15 cm x 42 cm	
Materials	background: craft paper, handmade paper, Belgian linen loose fragments: handmade paper, cotton thread	
Techniques	stitching and paper/fabric cutouts	

A 3 Sample 1.3



Set no. 1	Sample no. 3	
Action	adding removing	
Strategy	cutouts of paper	
Interaction	the loose fragments are to be placed on the background in their corresponding spot. The inhabitants need to find where each loose fragment goes. To help with that the shape of the loose fragment is matching a shape on the background.	
Dimensions	21 cm x 13 cm	
Materials	background: linen paper, pineapple fabric, cotton thread loose fragments: pergamenata paper	
Techniques	stitching, pergamenata paper cutouts, and linen paper cutouts	

A 4 Sample 1.4



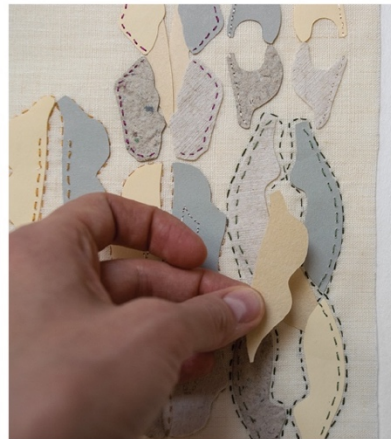
Set no. 1	Sample no. 4	
Action	adding removing	
Strategy	cutouts of paper	
Interaction	the loose fragments need to be added to or removed from the background in a certain order. The scale of each fragment can be used to figure out the order of the fragments as when adding them they go from large to small and viceversa when removing them.	
Dimensions	13 cm x 13 cm	
Materials	background: pineapple fabric, linen paper, cotton thread loose fragments: Stonehenge paper, linen paper	
Techniques	stitching and paper cutouts	

A 5 Sample 1.5



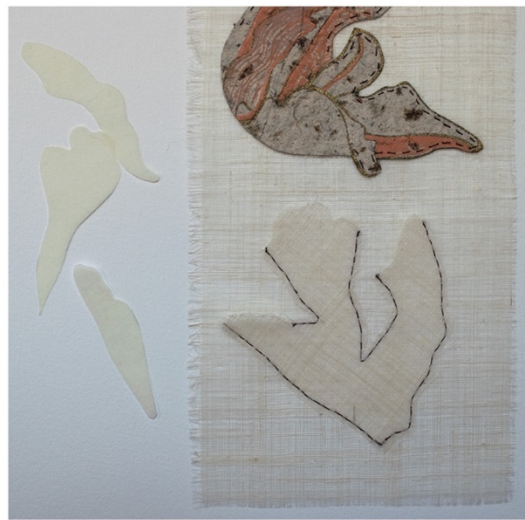
Set no. 1	Sample no. 5	
Action	adding removing	
Strategy	cutouts of paper	
Interaction	the loose fragments can be placed wherever they fit on the background. The background is made of a piece of paper that has random paper shapes stitched to it. In this way it creates areas where parts of the loose fragments can be inserted, thus staying attached.	
Dimensions	17 cm x 41 cm	
Materials	background: handmade paper, Stonehenge paper, and pergamenata paper, cotton thread loose fragments: laser print on copy paper	
Techniques	stitching and paper/fabric cutouts	

A 6 Sample 1.6



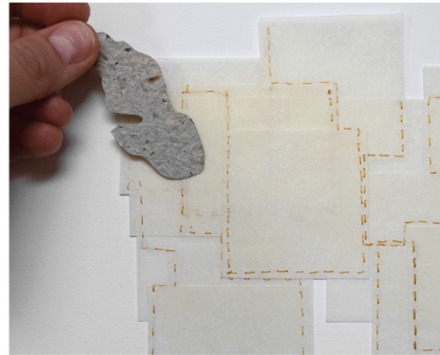
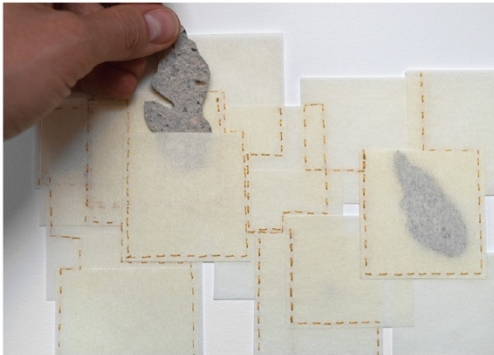
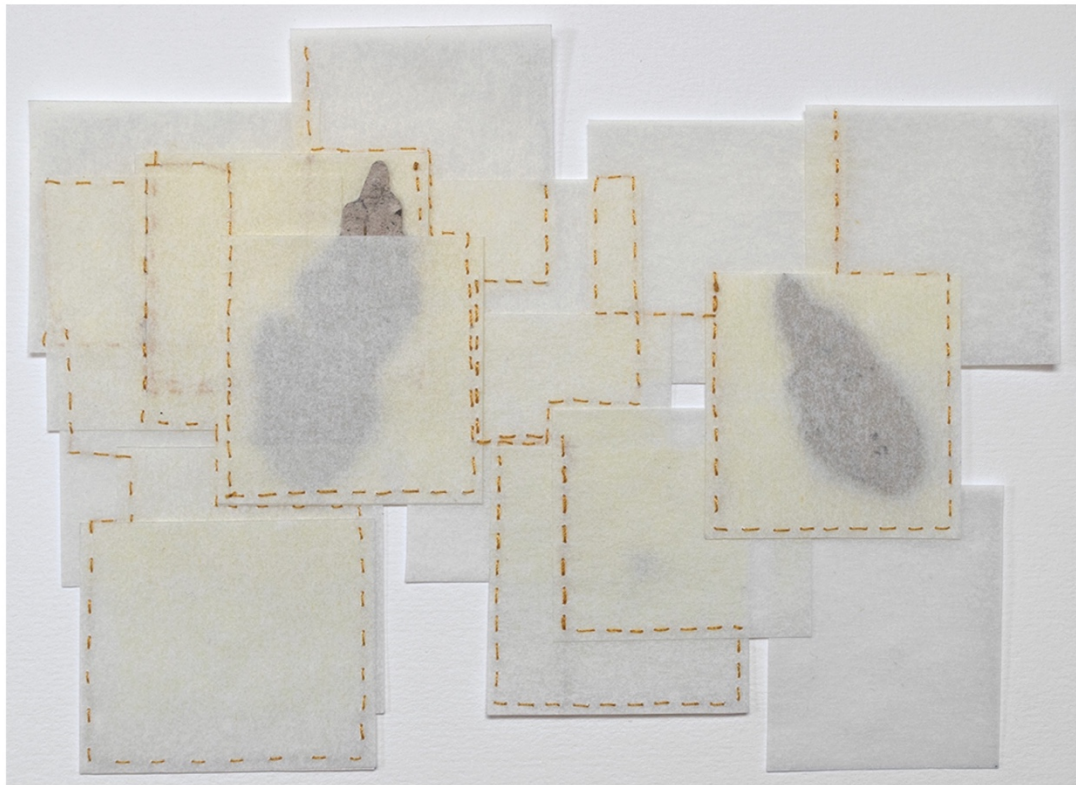
Set no. 1	Sample no. 6
Action	adding removing
Strategy	cutouts of paper
Interaction	the loose fragments are to be held in place by the pieces of fabric and paper that are stitched on the background. They can be placed in any of the areas where they would fit.
Dimensions	15 cm x 34 cm
Materials	background: Belgian linen, linen paper, handmade paper, craft paper, cotton thread loose fragments: Japanese rice paper
Techniques	stitching and paper/fabric cutouts

A 7 Sample 1.7



Set no. 1	Sample no. 7
Action	adding removing
Strategy	cutouts of paper + pockets
Interaction	the loose fragments are to be placed in the pockets that are on the background.
Dimensions	10 cm x 20 cm
Materials	background: fine pineapple fabric, handmade paper, cotton thread, gouache paint loose fragments: pergamenata paper
Techniques	stitching and paper/fabric cutouts

A 8 Sample 1.8



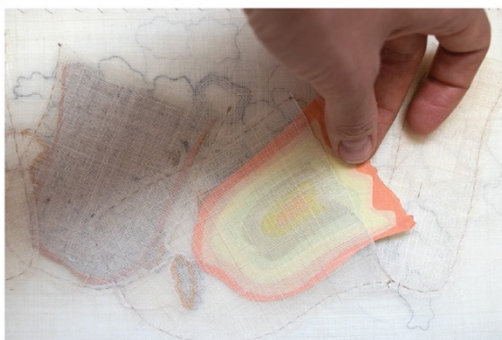
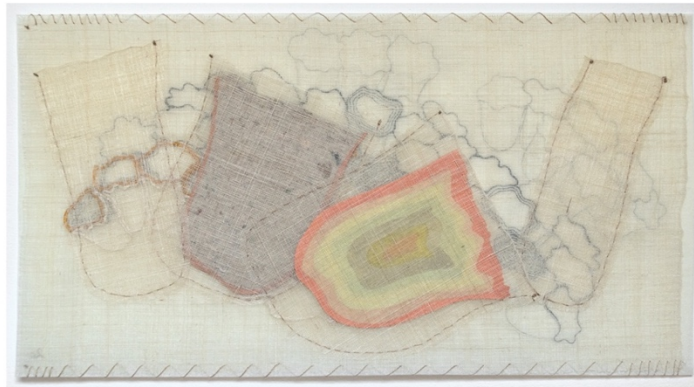
Set no. 1	Sample no. 8	
Action	adding removing	
Strategy	cutouts of paper + pockets	
Interaction	the loose fragments are to be placed in the pockets that make up the background	
Dimensions	20 cm x 14 cm	
Materials	background: pergamenata paper, cotton thread loose fragments: handmade paper	
Techniques	stitching and paper cutouts	

A 9 Sample 1.9



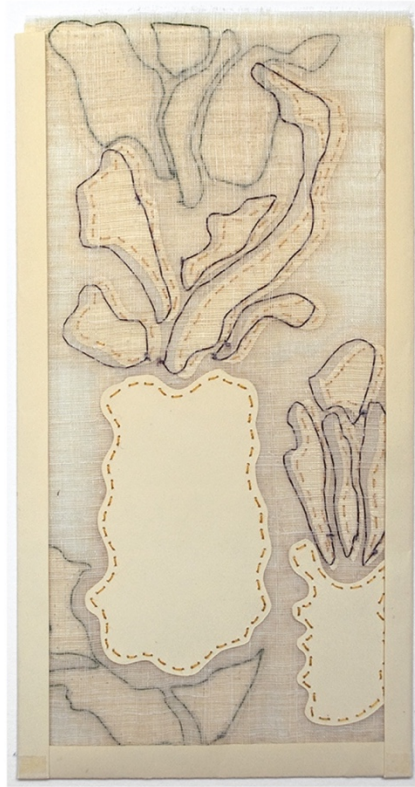
Set no. 1	Sample no. 9	
Action	adding removing	
Strategy	cutouts of paper + pockets	
Interaction	the loose fragments are to be placed in the pockets that exist on the back of the background piece	
Dimensions	14 cm x 46 cm	
Materials	background: fine pineapple fabric, linen paper, Stonehenge paper, gouache paint, cotton thread, pergamenata paper loose fragments: Arches paper, gouache paint	
Techniques	stitching and paper cutouts	

A 10 Sample 1.10



Set no. 1	Sample no. 10
Action	adding removing
Strategy	cutouts of paper + pockets
Interaction	the loose fragments are to be placed in the pockets that are part of the background piece
Dimensions	28 cm x 15 cm
Materials	background: fine pineapple fabric, pergamenata paper, cotton thread, ink loose fragments: Arches paper, gouache paint
Techniques	stitching and paper cutouts

A 11 Sample 1.11



Set no. 1	Sample no. 11
Action	adding removing
Strategy	cutouts of fabric and paper
Interaction	the loose fragments are to be placed on the background by sliding them inside the background piece. They can be placed in whichever order the inhabitant wishes.
Dimensions	10 cm x 19 cm
Materials	background: craft paper, cotton thread loose fragments: fine pineapple fabric, craft paper, pergamenata paper, cotton thread
Techniques	stitching and paper/cutouts

Appendix B – Medium-Scale Samples in set no. 1

B 1 Medium-scale sample 1



Set no. 1	Medium-Scale Sample no. 1	
Action	adding removing	
Strategy	pockets	
Interaction	the loose fragments are to be placed in the pockets that are on the back of the background panel. One or more fragments could be placed in one pocket.	
Dimensions	30 cm x 40 cm	
Materials	background: cotton gauze, Belgian linen, pineapple fiber, rayon thread, textile pigments loose fragments: Arches paper	
Techniques	screen printing, digital printing, hand embroidery, and paper cutting	

B 2 Medium-scale sample 2



Set no. 1	Medium-Scale Sample no. 2
Action	adding removing
Strategy	pockets
Interaction	the purple loose fragments must be placed in their corresponding pocket (the shape that resembles their shape); the green loose fragments can be placed in any of the pockets embroidered with green thread.
Dimensions	25 cm x 35 cm
Materials	background: pineapple fiber, Japanese paper, rayon thread, textile pigments loose fragments: Arches paper, gouache paints, ink pens
Techniques	screen printing, hand drawing, hand embroidery, and paper cutting



Set no. 1	AE no. 1	Large-Scale Artefact no. 1	Title: Home Pharmacy
Action	adding removing		
Strategy	cutouts of paper		
Interaction	the loose fragments are to be placed in their corresponding area on the background panel. To do so, slide the little legs of each fragment in the cut-out area of the panel. The easiest way to identify the fragment's place is by looking at its shape and finding the same shape on the panel.		
Dimensions	90 cm x 130 cm		
Materials	background: linen paper, textile pigments loose fragments: Arches paper		
Techniques	screen printing and paper cutting		

Appendix D – Large-Scale Artefacts in set no. 1 for the second adoption experiment

D 1 Artefact 2.1



Set no. 1	AE no. 2	Large-Scale Artefact no. 1	
Action	adding removing		
Strategy	pockets		
Interaction	the loose fragments are to be placed in the pockets that are on the back of the background piece. One or more fragments could be placed in the same pocket. The participant can place the loose fragments in whichever pocket it fits.		
Dimensions	70 cm x 50 cm		
Materials	background: pineapple fiber, linen paper, pergamenta paper, Arches paper, rayon thread, gouache paints loose fragments: Arches paper and gouache paints		
Techniques	hand embroidery, painting and paper cutting		

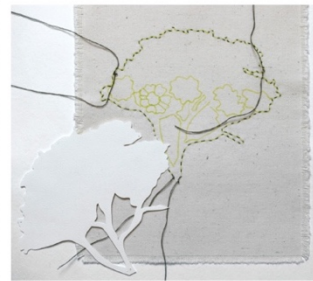
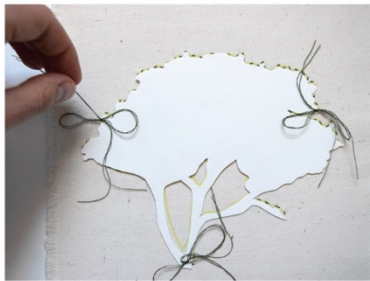
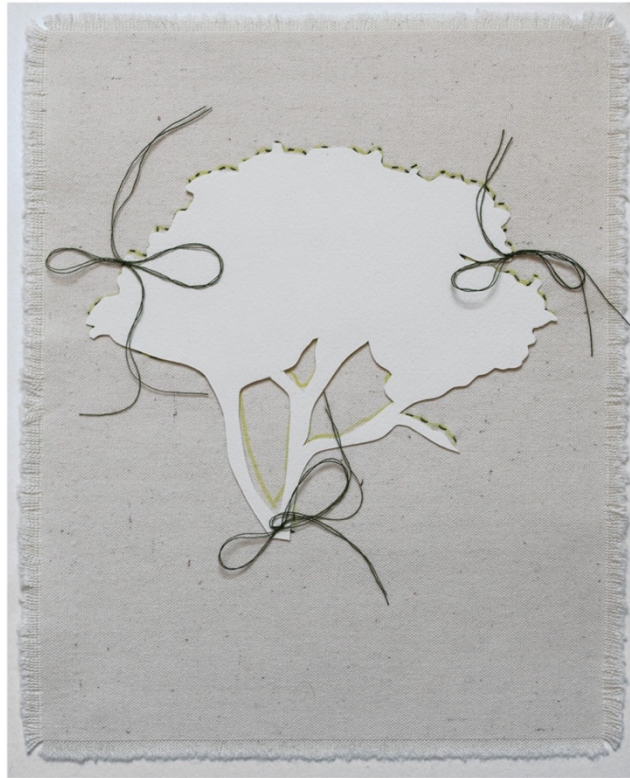
D 2 Artefact 2.2



Set no. 1	AE no. 2	Large-Scale Artefact no. 2	
Action	adding removing		
Strategy	pockets		
Interaction	the loose fragments are to be placed in the pockets that are part on the front of the background panel.		
Dimensions	60 cm x 60 cm		
Materials	background: polyester dorado, cotton gauze, pineapple fiber, rayon thread, heat transfer dyes loose fragments: Arches paper		
Techniques	digital printing, hand embroidery and paper cutting		

Appendix E – Small-Scale Samples in set no. 2

E 1 Sample 2.1

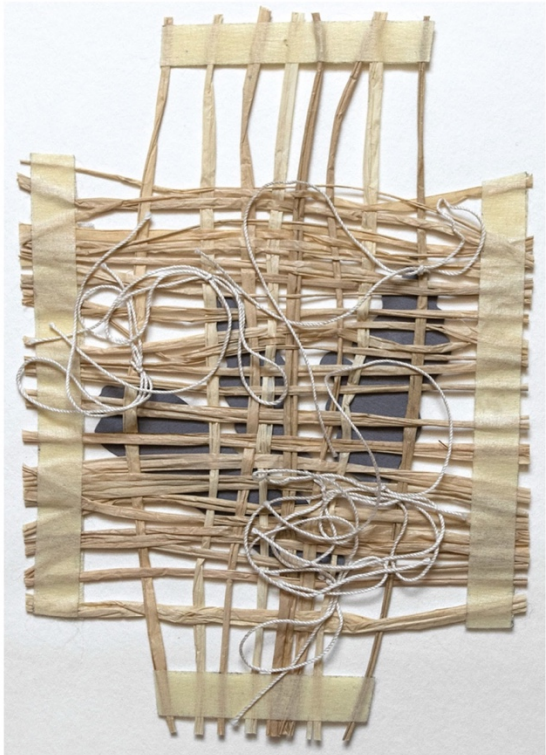


Set no. 2	Sample no. 1	
Action	adding removing	
Strategy	tie untie	
Interaction	the loose fragments need to be tied to the background using the strings attached to the background.	
Dimensions	20 cm x 25 cm	
Materials	background: cotton canvas, cotton thread loose fragment: Stonehenge paper	
Techniques	stitching and paper cutouts	

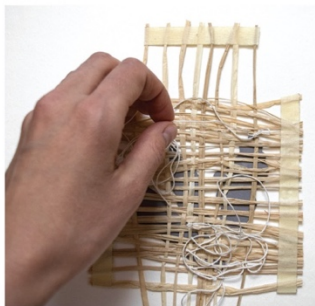
E 2 Sample 2.2



Front



Back



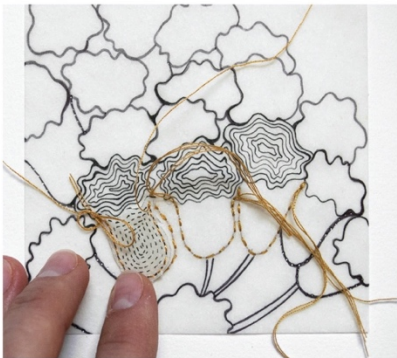
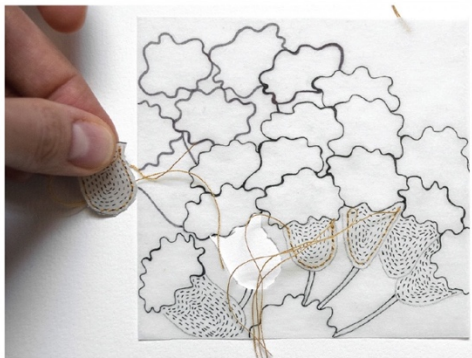
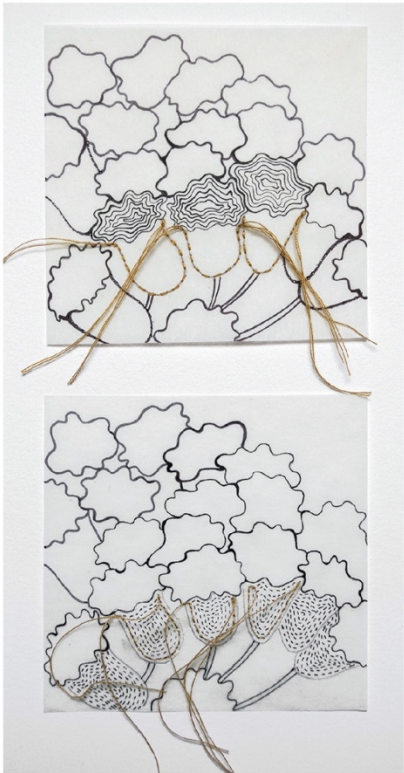
Set no. 2	Sample no. 2	
Action	adding removing	
Strategy	tie untie	
Interaction	because of the open structure of the background, the loose fragments can be placed wherever the inhabitant desires. Thus, the inhabitant acts as a designer, being able to create their own composition.	
Dimensions	14 cm x 21 cm	
Materials	background: raffia fibre, masking tape loose fragments: craft paper, cotton yarn	
Techniques	hand weaving and paper cutouts	

E 3 Sample 2.3



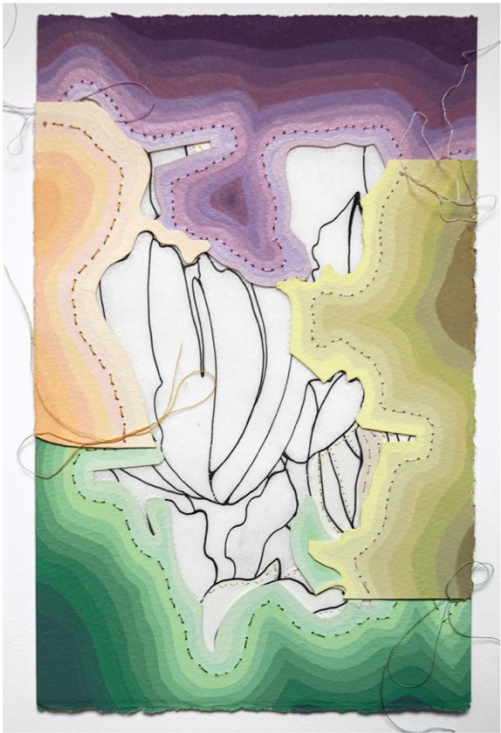
Set no. 2	Sample no. 3	
Action	adding removing	
Strategy	tie untie	
Interaction	each loose fragement has a different shape that matches a shape on the background. After the inhabitants identifies where the fragment needs to be placed, they can attach it to using the threads that are attached to the background to the ones attached to the fragment.	
Dimensions	45 cm x 30 cm	
Materials	background: Stonehenge paper, gouache paint, cotton thread loose fragments: pergamenata paper	
Techniques	painting, stitching and paper cutouts	

E 4 Sample 2.4



Set no. 2	Sample no. 4	
Action	adding removing	
Strategy	tie untie	
Interaction	the loose fragments need to first be released from background 1, and then attached to the background 2 by tying them using the strings attached to the loose fragments and the background 2.	
Dimensions	9.5 cm x 9.5 cm [each piece]	
Materials	background: pergamenata paper, ink, cotton thread loose fragments: pergamentate paper, cotton thread	
Techniques	drawing, stitching and paper cutouts	

E 5 Sample 2.5

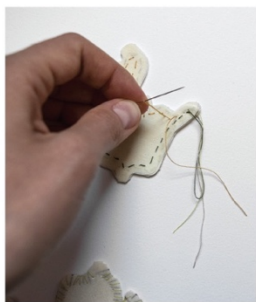


Set no. 2	Sample no. 5	
Action	removing	
Strategy	unstitch	
Interaction	the loose fragments need to be unstitched from the background using a sewing needle, so that the background is exposed and with it the painted pieces of Stonehenge paper infused with essential oils.	
Dimensions	14.5 cm x 23 cm	
Materials	background: pergamenata paper, cotton thread, ink, Stonehenge paper loose fragments: Stonehenge paper, gouache paint, cotton thread	
Techniques	drawing, stitching and paper cutouts	



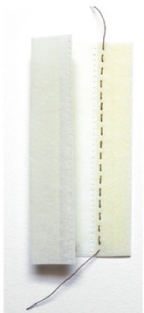
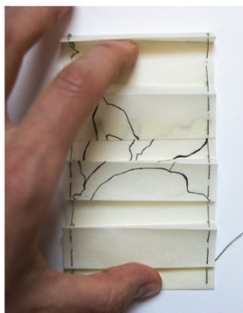
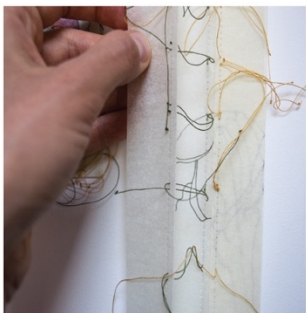
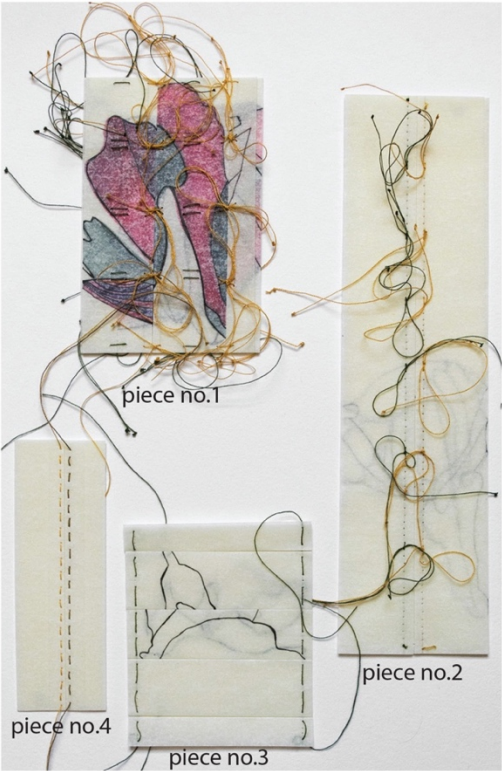
Set no.2	Sample no.6
Action	removing
Strategy	unstitch
Interaction	the loose fragments need to be unstitched from the background using a sewing needle, so that the painted pieces of Stonehenge paper infused with essential oils are exposed.
Dimensions	18.5 cm x 40.5 cm
Materials	background: Belgian linen, pergamenata paper, Stonehenge paper, gouache paint, cotton thread loose fragments: pergamenata paper
Techniques	painting, stitching, paper cutouts

E 7 Sample 2.7







Set no. 2	Sample no. 7	
Action	removing	
Strategy	unstitch	
Interaction	the paper/fabric fragments need to be unstitched using a sewing needle, so that the pieces that are inside and that are infused with essential oils are exposed	
Dimensions	10 cm x 7 cm [piece no.1] and 11 cm x 10 cm [piece no.2]	
Materials	pergaminata paper, cotton canvas, Stonehenge paper, handmade paper, cotton thread *these samples do not follow the structure of a background and loose fragments	
Techniques	stitching and paper cutouts	

E 8 Sample 2.8





Set no. 2	Sample no. 8	
Action	removing	
Strategy	unstitch	
Interaction	in piece no.1 and no.2 the threads need to be untied so that the paper unfolds and releases the essential oils; in piece no.3 and no.4 the stitching needs to be undone, so that the paper unfolds and releases the essential oils.	
Dimensions	6.5 cm x 10 cm [no.1], 5 cm x 20 cm [no.2], 6.5 cm x 8 cm [no.3], and 3 cm x 9 cm [no.4]	
Materials	pergaminata paper, cotton thread, ink, colored markers *these samples do not follow the structure of a background and loose fragments	
Techniques	drawing, stitching, folding	

E 9 Sample 2.9



front

back



Set no. 2	Sample no. 9
Action	N/A
Strategy	tie untie
Interaction	the portions of the background that are tied using cotton thread to the rest of the background need to be untied so that it exposed the areas of paper infused with essential oils
Dimensions	19 cm x 41 cm
Materials	Belgian linen, fine pineapple fabric, cotton thread, Stonehenge paper, gouache paint *these samples do not follow the structure of a background and loose fragments
Techniques	painting, stitching, paper cutouts



Set no.2	Sample no. 10
Action	removing
Strategy	unstitch
Interaction	the loose fragments need to be unstitched from the background using a sewing needle, so that the painted pieces of handmade paper infused with essential oils are exposed.
Dimensions	18 cm x 36 cm
Materials	background: fine pineapple fabric, textile pigments, handmade paper, acylic paints, cotton thread loose fragments: pergamenata paper
Techniques	painting, printing, stitching, paper cutouts

F 1 Medium-scale sample 1



Set no. 2	Medium-Scale Sample no. 1	
Action	adding removing	
Strategy	tie untie	
Interaction	the loose fragment can be tied to the background panel using the strings attached to the loose fragment and to the background panel.	
Dimensions	30 cm x 45 cm	
Materials	background: linen, rayon thread, textile pigments loose fragments: cotton gauze, linen paper, textile pigments	
Techniques	digital printing, hand embroidery and paper cutting	

F 2 Medium-scale sample 2

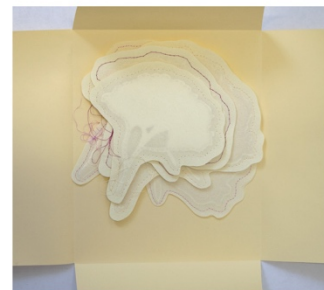


Set no. 2	Medium-Scale Sample no. 2	
Action	removing	
Strategy	unstitch	
Interaction	the loose fragments can be unstitched from the background panel using a sewing needle, so that the embroidered pieces infused with essential oils are exposed.	
Dimensions	30 cm x 45 cm	
Materials	background: cotton gauze, rayon thread, linen, textile pigments, natural dyes loose fragments: linen, wool felt, textile pigments, pergamenata paper	
Techniques	digital printing, hand embroidery and paper cutting	



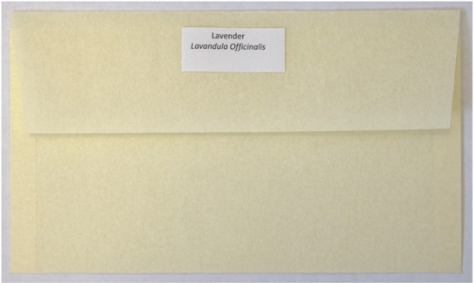
Set no. 2	AE no. 1	Large-Scale Artefact no. 2	Title: Remedial Landscape
Action	adding removing		
Strategy	tie untie		
Interaction	each loose fragment has a different shape that matches a shape on the background panel. After the participant identifies where the fragment goes, they can attach it to the background using the threads that are attached to the background to the ones attached to the fragment.		
Dimensions	135 cm x 195 cm		
Materials	background: linen, cotton gauze, rayon thread loose fragments: linen paper, Japanese paper, rayon thread		
Techniques	digital printing and paper cutting		

H 1 Artefact 2.3



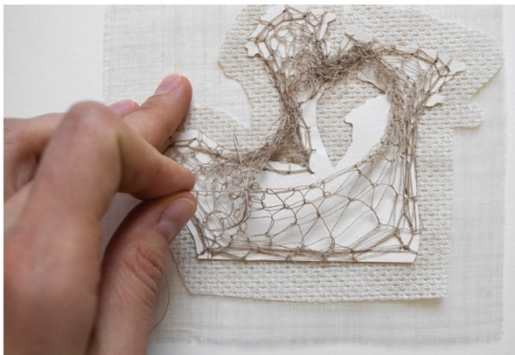
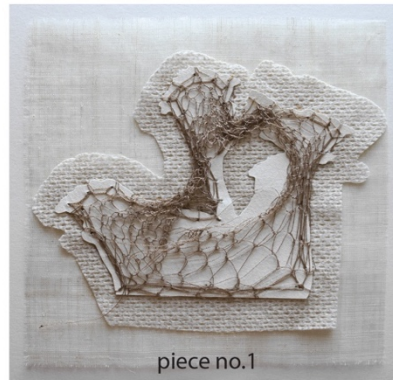
Set no. 1	AE no. 2	Large-Scale Artefact no. 3
Action	adding removing	
Strategy	tie untie	
Interaction	each loose fragment has a different shape that matches a shape on the background. After the participant identifies where the fragment goes, they can attach it to the background panel using the threads that are attached to the background to the ones attached to the fragment.	
Dimensions	70 cm x 100 cm	
Materials	background: polyester dorado, rayon thread, cotton yarn, heat transfer dyes loose fragments: Arches paper, Japanese paper	
Techniques	digital printing, hand embroidery and paper cutting	

H 2 Artefact 2.4



Set no. 1	AE no. 2	Large-Scale Artefact no. 4	
Action	removing		
Strategy	unstitch		
Interaction	the loose fragments can be unstitched from the background panel using a sewing needle, so that the painted pieces of Arches paper infused with essential oils are exposed.		
Dimensions	40 cm x 60 cm		
Materials	background: cotton gauze, linen paper, rayon thread, textile pigments loose fragments: Arches paper, pergamenata paper		
Techniques	digital printing, hand embroidery and paper cutting		

I 1 Sample 3.1



Set no. 3	Sample no. 1	
Action	removing	
Strategy	undo crochet	
Interaction	the thread needs to be pulled to undo the crochet and release the paper fragment infused with essential oils.	
Dimensions	14 cm x 14 cm [piece no.1] and 14 cm x 11cm [piece no.2]	
Materials	background: fine pineapple fabric, linen paper, cotton thread [piece no.1]; pineapple fabric, cotton thread loose fragments: Stonehenge paper	
Techniques	crochet and paper cutouts	

I 2 Sample 3.2



Set no. 3	Sample no. 2	
Action	removing	
Strategy	undo crochet	
Interaction	the thread needs to be pulled to undo the crochet and release the paper fragment infused with essential oils.	
Dimensions	19 cm x 15 cm	
Materials	background: Belgian linen, linen paper, cotton thread loose fragments: pergamenata paper	
Techniques	crochet and paper cutouts	

I 3 Sample 3.3



Set no. 3	Sample no. 3
Action	removing
Strategy	undo crochet
Interaction	variations of crocheted fragments of paper and/or fabric. these are intended to be used in the design of piece whose interaction is based on the same principle of undoing the crochet in order to release/expose fragments infused with essential oils.
Dimensions	21 cm x 27.5 cm
Materials	background: Belgian linen, linen paper, cotton thread loose fragments: pergamenata paper
Techniques	crochet and paper cutouts

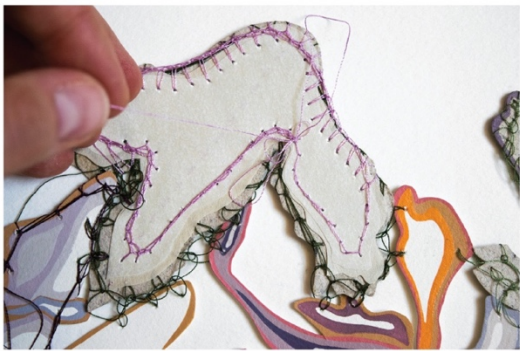
I 4 Sample 3.4



piece no.1



piece no.2



Set no. 3	Sample no. 4	
Action	removing	
Strategy	undo crochet	
Interaction	the thread needs to be pulled to undo the crochet and release the paper fragment infused with essential oils.	
Dimensions	19 cm x 30 cm [piece no.1] and 20 cm x 38 cm [piece no.2]	
Materials	background: linen paper, handmade paper, Japanese paper, Stonehenge paper, gouache paint, cotton thread loose fragments: Japanese paper	
Techniques	crochet and paper cutouts	

I 5 Sample 3.5



Set no.3	Sample no.5
Action	removing
Strategy	undo crochet
Interaction	the thread needs to be pulled to undo the crochet and release the paper fragment infused with essential oils
Dimensions	16 cm x 41 cm
Materials	background: Belgian linen, Stonehenge paper, handmade paper, fine pineapple fabric, linen paper, cotton thread loose fragments: pergaminata paper
Techniques	crochet and paper cutouts

Appendix J – Medium-Scale Samples in set no. 3

J 1 Medium-scale sample 1

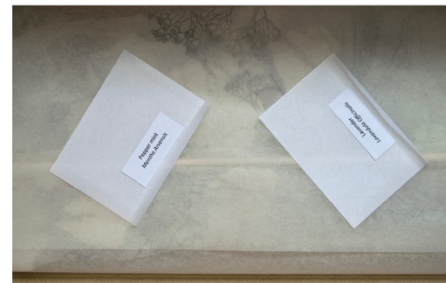


Set no. 3	Medium-Scale Sample no. 1	
Action	removing	
Strategy	unravel crochet	
Interaction	the thread needs to be pulled to undo the crochet and release the loose fragment infused with essential oils.	
Dimensions	40 cm x 75 cm	
Materials	background: Belgian linen, rayon thread, textile pigments loose fragments: linen paper, pergamenata paper, rayon thread	
Techniques	screen printing, hand embroidery, crochet, fabric and paper cutting	

J 2 Medium-scale sample 2



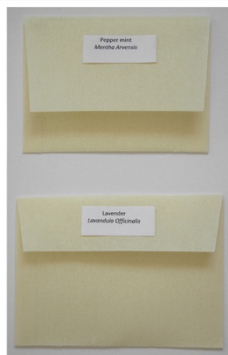
Set no. 3	Medium-Scale Sample no. 2	
Action	removing	
Strategy	unravel crochet	
Interaction	the thread needs to be pulled to undo the crochet and release the loose fragments infused with essential oils.	
Dimensions	40 cm x 75 cm	
Materials	background: Japanese paper, rayon thread, acrylic pigments loose fragments: linen paper, pergamenata paper, rayon thread	
Techniques	screen printing, hand embroidery, crochet, fabric and paper cutting	



Set no. 3	AE no. 1	Large-Scale Artefact no. 3	Title: Nest Engagement
Action	removing		
Strategy	unravel crochet		
Interaction	the thread needs to be pulled to undo the crochet and release the loose fragments infused with essential oils.		
Dimensions	60 cm x 85 cm		
Materials	background: silk gauze, rayon thread, textile pigments loose fragments: linen paper, pergamenata paper, rayon thread		
Techniques	screen printing, hand embroidery, crochet, fabric and paper cutting		

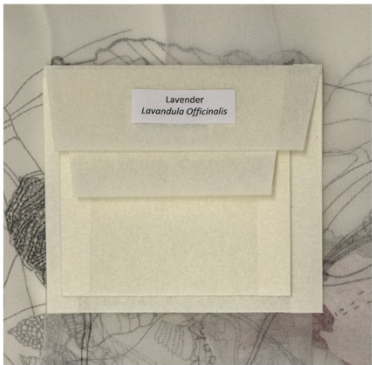
Appendix L – Large-Scale Artefacts in set no. 3 for the second adoption experiment

L 1 Artefact 2.5



Set no. 3	AE no. 2	Large-Scale Artefact no. 5	
Action	removing		
Strategy	unravel crochet		
Interaction	the thread needs to be pulled to undo the crochet and release the loose fragments infused with essential oils.		
Dimensions	50 cm x 80 cm		
Materials	background: silk organza, rayon thread, textile pigments loose fragments: linen paper, pergamenata paper, rayon thread		
Techniques	screen printing, hand embroidery, crochet, fabric and paper cutting		

L 2 Artefact 2.6 (*Nest Engagement*) (re-made)



Set no. 3	AE no. 2	Large-Scale Artefact no. 6	Title: Nest Engagement
Action	removing		
Strategy	unravel crochet		
Interaction	the thread needs to be pulled to undo the crochet and release loose fragment infused with essential oils.		
Dimensions	60 cm x 85 cm		
Materials	background: silk gauze, rayon thread, textile pigments loose fragments: linen paper, pergamenata paper, rayon thread		
Techniques	screen printing, hand embroidery, crochet, fabric and paper cutting		

The study to operationalise the concept of awareness about air pollution/quality at home was conducted using a social media platform (i.e., Facebook Messenger). In order to identify what people associate with air pollution/quality at home I asked 12 of my Facebook contacts to respond to the following:

'In the day to day life, please name 5 actions that make you aware of the level of air pollution/quality in your home'.

Answers:

Respondent no.1

- (1) I pay attention to how much dust I have in my home.
- (2) When buying cleaning products, I always look at the label to make sure they are 'eco' friendly.
- (3) I open the window (even in the winter) to ventilate the air in my house.
- (4) I avoid making steam in my home (such as taking long hot baths, making complicated means that require prolonged boiling of food, etc.) as this will cause mould.
- (5) I prefer wooden floors to carpeted floors as they are more hygienic, and when I visit someone with carpeted floors, I always keep my shoes on.

Respondent no. 2

- (1) When there are fumes from cooking grease.
- (2) When I see mould in the house.
- (3) When I think of chemicals in cleaning supplies.
- (4) When I use insect repellent.
- (5) When I pay attention to the amount of dust in a house (this is only when I am in southern New Mexico in March and April, where massive dust storms are frequent).

Respondent no. 3

- (1) When I handle paints and solvents! I'm a painter, so there's constantly solvents being used in my basement. I'm also always re-painting the rooms in my house.
- (2) When I use artificial scents! I try to not use scented candles, air freshener, etc.
- (3) When I use cleaning supplies (fabric softener).
- (4) Dust is an indoor air pollutant, right? I have LOTS of dust. And cat hair. Lots of cat hair.
- (5) I heard that most newly manufactured furniture and fabrics are coated with some kind of fire-repellant that off-gases. Also, shower curtains off-gas bad fumes, so I replaced my very toxic-smelling plastic shower curtain with water-repellant fabric one.

Respondent no. 4

- (1) When fumes from roasting peppers or something like that build up, I turn on the oven fan.
- (2) In the bathroom, I turn on the fan sometimes to take out humidity after a shower. If I forget to do this for a while, I notice a faint mold smell, so then I remember. In the basement, we run a humidifier during summer months to combat moisture/mould.
- (3) We also do a lot of renovating, so I set up screens of plastic when we are sanding plaster to capture dust, and I wear a respirator.
- (4) When we are painting, I turn on a fan or open windows to get fumes out.
- (5) Open the windows more often to let in fresh air, but here is cold so much of the year, and we are paying for heat.

Respondent no. 5

We don't smoke, have no carpet, do not use air fresheners or dryer sheets. We have plenty of plants that purify the air. We have lots of windows for air circulation and an air exchanger for ventilation.

- (1) Cleaning windows and mirrors using Windex (cleaning supplies).
- (2) Occasionally burning food when cooking.
- (3) Making a fire in the woodstove.
- (4) Painting walls.
- (5) Lighting candles.

Respondent no. 6

- (1) When I dust.
- (2) When I ventilate the house after a long winter.
- (3) When I vacuum.
- (4) When I take care of my indoor plants.
- (5) When I change the furnace filters.

Respondent no. 7

- (1) I check the labels of cleaning products.
- (2) I do not bring fragranced products (hygiene products, soaps) in the home.
- (3) I pay attention to mildew.
- (4) When I handle chemicals associated with paints/dyes/coating in studio.
- (5) When I use my heater or AC system.

Respondent no. 8

- (1) When I dust.
- (2) When someone smokes or when I cook something that produces a lot of smoke.
- (3) When using varnish or paint in the home.
- (4) When I vacuum.
- (5) When I clean the vents.

Respondent no. 9

- (1) When someone smokes.
- (2) When I dust the shelves, the windows, the floors.
- (3) I get rid of organic waste often as it produces lots of mould spores.
- (4) I keep doors and windows open.
- (5) When the smell is stale.

Respondent no. 10

- (1) I usually open my windows for 10 minutes or so in the morning/afternoon.
- (2) When I vacuum.
- (3) I have a few plants in our living room hoping they will produce fresh air as they grow.
- (4) When the air is really dry, I use a humidifier, but if it is not enough, I boil water for 30 min or so in big cooking pots.

Respondent no. 11

- (1) My awareness that our house is pretty air-tight. I used to find comfort in air circulation caused by drafts, but it has been so cold, and I've been away so much that I've added weather stripping everywhere.
- (2) I see dust under things all the time.
- (3) Food smells after cooking make me think the kitchen isn't ventilated properly.
- (4) Concerns having to do with owning a cat: seeing hair on surfaces and clothing and in the dryer lint trap. I see hair and dandruff coming off of her.

Respondent no. 12

- (1) Sometimes we run the air conditioning even when it's not hot because of the humidity. This prevents mildew and mould growth.
- (2) I don't live in a big city so we don't have to worry about keeping windows open.
- (3) We have a carbon monoxide detector in case we have a gas leak.

N 1 Participant Information Sheet for the first adoption experiment



PARTICIPANT INFORMATION SHEET

What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

My name is Elena Brebenel and I am inviting you to take part in my PhD research carried at Central Saint Martins, University of the Arts London.

Before you decide whether or not to participate, it is important that you read through this information carefully, so that you understand the purpose of this research and what will involve for you. I will go through this information sheet with you and answer any questions you may have.

This project aims to identify the potential that bioinspired textile artefact have in raising awareness about elements of the home environment readily accessible to our senses. The participation described below will support part of my study.

The following steps describe what I am asking you to do:

Step 1 involves 'adopting' a textile artefact and having it in your home for a period of two weeks.

The artefact

- are inspired by Blue Tit bird behaviour, which consists of placing in their nests aromatic herbs [e.g. lavender (*Lavandula stoechas*), yarrow (*Achillea ligustica*), daisy (*Helichrysum italicum*), and apple mint (*Mentha suaveolens*)] that have antimicrobial characteristics that protect chicks against pathogenic bacteria [Ask Nature, 2017]. Because the work is inspired by a behaviour the artefact is designed to be interactive.
- contain components which include essential oils of lavender (*Lavandula officinalis*) and pepper mint (*Mentha arvensis*).
- come with a hanging device, but it is up to you to decide where in the home you wish to place it.
- vary in scale: small (30 x 60 cm, 90 x 120 cm and 120 x 200 cm)
- are made by hand, out of textile materials and utilize a series of craft techniques.

Your actions: You are invited

- to add to the artefact and/or remove from the artefact small fragments of paper and/or fabric (provided with the artefact).
- to record your engagement with it by writing in the journal provided, noting the activity you performed, the approximate time you spent engaging with the artefact, and the dates and times when the interactions took place.
- to take photographs of the artefact after you install it at home, to show the setting in which it is placed.

Step 2 involves taking part in an interview.

- The interview will last approximately one hour and will take place at the end of the two weeks.
- During the interview data will be collected through audio recordings.
- Following the interview written transcripts will become part of the data. You will have the right to check the accuracy of the written data and correct any errors or ask for any material to be removed.

If you agree to take part you are asked to sign a consent form.

If you have any fragrance sensitivity, or you suffer from fragrance allergies, or if you have any concerns about the use of essential oils in the artefact I recommend you do not take part in this study.

If once you have started the 'adoption' process, you wish to stop participating in the study, you have the right to do so, without giving a reason and with no detriment to yourself. Also, any information you have provided will not be further considered, and will be destroyed.

Any material you provide as a result of steps 1 & 2 above may be used in written accounts of my research. The results of this study will not be kept confidential, they will be public and will be available to other researchers.

The identity of the participants will be kept strictly confidential throughout this research project. In my writing, I will be referring to them by their roles (e.g. participant 1), apart from specific material in relation to which they would prefer to have their name quoted. Any comments made during the interview will be attributed to them.

I do not foresee any physical risks in taking part in the study. Although there are no immediate benefits, individuals may find the interaction with the artefacts enjoyable.

If you have any further questions about this study or completing the tasks, or if you require additional information please contact me at any time and I will get back to you personally. My contact address is: e.brebenel1@arts.ac.uk.

This research has been reviewed and accepted by the University of the Arts London ethics committee.

Thank you for reading this information sheet. Please keep this for your records.

PARTICIPANT INFORMATION

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Director of Studies: Prof. Carole Collet

Research Student: Elena Brebenel

You are invited to take part in this research project whose aim is to identify the potential that bioinspired textile artefacts have in raising awareness about elements of the home environment readily accessible to our senses. Your participation described below will support part of this study. Elena Brebenel, PhD student at University of the Arts London, UK and Assistant Professor of Textiles at NSCAD University, Halifax, Nova Scotia is the researcher requesting your participation.

Before you decide whether or not to participate, it is important that you read through this information carefully, so that you understand the purpose of this research and what will involve for you. Please do not hesitate to contact me with any questions you may have and I will get back to you with answers to your questions.

The following steps describe what I am asking you to do:

Step 1 involves filling out an adoption form.

- The adoption form is utilized as a recruitment tool. You will be selected to take part in this research project based on your answers to the questions in the adoption form.
- The selection criteria include: your availability during the two weeks you will have the artefact in your home, your interest in this type of artefact and your home, as well as in this research project.
- Upon reviewing the adoption form, I will contact the selected participants to arrange for the delivery of the artefact.

Step 2 involves 'adopting' a textile artefact and having it in your home for a period of two weeks.

The artefact

- is inspired by Blue Tit bird behaviour, which consists of placing in their nests aromatic herbs [e.g. lavender (*Lavandula stoechas*), yarrow (*Achillea ligustica*), daisy (*Helichrysum italicum*), and apple mint (*Mentha suaveolens*)] that have antimicrobial characteristics that protect chicks against pathogenic bacteria [Ask Nature, 2017]. Because the work is inspired by a behaviour the artefact is designed to be interactive.
- contains components which include essential oils of lavender (*Lavandula officinalis*) and pepper mint (*Mentha arvensis*).
- comes with a hanging device, but you decide where in the home you wish to place it.
- is made by hand, out of textile materials and utilize a series of craft techniques.

Your actions: You are invited

- to add to the artefact and/or remove from the artefact small fragments of paper and/or fabric (provided with the artefact).
- to record your engagement with the artefact by writing in the journal provided, noting the activity you performed, the approximate time you spent engaging with the artefact, and the dates and times when the interactions took place.
- to take a photograph of the artefact after you install it at home, to show the setting in which it is placed.

Step 3 involves taking part in an interview.

- The interview will last approximately one hour and will take place at the end of the two weeks.
- During the interview, you will be asked questions related to the nature of the interactions with the artefact, the design of the artefact, and the overall two-week experience of having the artefact in your home.
- During the interview data will be collected through audio recordings.
- Following the interview written transcripts will become part of the data. You will have the right to check the accuracy of the written data and correct any errors or ask for any material to be removed.

If you agree to take part you are asked to sign a consent form.

If you have any fragrance sensitivity, or you suffer from fragrance allergies, or if you have any concerns about the use of essential oils in the artefact I recommend you do not take part in this study. If you decide to take part in this study and throughout you notice an allergic reaction please stop immediately the interaction with the artefact and see a physician.

If once you have started the 'adoption' process, you wish to stop participating in the study, you have the right to do so, without giving a reason and with no detriment to yourself. Also, any information you have provided will not be further considered, and will be destroyed.

Any material you provide as a result of steps 1, 2 and 3 above may be used in written accounts of my research. The results of this study will not be kept confidential, they will be included in my PhD thesis, thus they will be public and will be available to other researchers.

Your identity will be kept strictly confidential throughout this research project. In my writing, I will be referring to you by your role (e.g. participant 1), apart from specific material in relation to which you would prefer to have your name quoted. Any comments made during the interview will be attributed to you.

I do not foresee any physical risks in taking part in the study. Although there are no immediate benefits, you may find the interaction with the artefact enjoyable.

If you have any further questions about this study or completing the tasks, or if you require additional information please contact me at any time and I will get back to you personally. My e-mail addresses are ebrebenel@nscad.ca and e.brebenel1@arts.ac.uk.

If you would like a summary of the results, please let me know by providing me with your e-mail address. When the study is completed, I will send it to you. The study is expected to be completed by December 2020.

This research has been reviewed and accepted by the University of the Arts London Research Ethics Committee and Saint Mary's University Research Ethics Board. If you have any comments or concerns about ethical matters, you may contact the Chair of the Saint Mary's University Research Ethics Board at ethics@smu.ca or 902-420-5728.

Thank you for reading this information sheet. Please keep this for your records.

PARTICIPANT INFORMATION

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Director of Studies: Prof. Carole Collet

Research Student: Elena Brebenel

You are invited to take part in a **second interview** that has to do with the research project whose aim is to identify the potential that bioinspired textile artifacts have in raising awareness about elements of the home environment readily accessible to our senses. Your participation described below will support part of this study. Elena Brebenel, PhD student at University of the Arts London, UK and Assistant Professor of Textiles at NSCAD University, Halifax, Nova Scotia is the researcher requesting your participation.

Before you decide whether or not to participate, it is important that you read through this information carefully, so that you understand the purpose of this research and what will involve for you. Please do not hesitate to contact me with any questions you may have and I will get back to you with answers to your questions.

Step 1, 2 and 3 below describe **what you already did**:

Step 1 involved filling out an adoption form.

- The adoption form was utilized as a recruitment tool. You were selected to take part in this research project based on your answers to the questions in the adoption form.
- The selection criteria included: your availability during the two weeks you will have the artifact in your home, your interest in this type of artifact and your home, as well as in this research project.
- Upon reviewing the adoption form, I contacted the selected participants to arrange for the delivery of the artifact.

Step 2 involved 'adopting' a textile artifact and having it in your home for a period of two weeks.

The artifact

- is inspired by Blue Tit bird behavior, which consists of placing in their nests aromatic herbs [e.g. lavender (*Lavandula stoechas*), yarrow (*Achillea ligustica*), daisy (*Helichrysum italicum*), and apple mint (*Mentha suaveolens*)] that have antimicrobial characteristics that protect chicks against pathogenic bacteria [Ask Nature, 2017]. Because the work is inspired by a behavior the artifact is designed to be interactive.
- contains components which include essential oils of lavender (*Lavandula officinalis*) and pepper mint (*Mentha arvensis*).
- comes with a hanging device, but you decide where in the home you wish to place it.
- is made by hand, out of textile materials and utilize a series of craft techniques.

Your actions: You were invited

- to add to the artifact and/or remove from the artifact small fragments of paper and/or fabric (provided with the artifact).
- to record your engagement with the artifact by writing in the journal provided, noting the activity you performed, the approximate time you spent engaging with the artifact, and the dates and times when the interactions took place.
- to take a photograph of the artifact after you install it at home, to show the setting in which it is placed.

Step 3 involved taking part in an interview.

- The interview lasted approximately one hour and took place at the end of the two weeks.
- During the interview, you were asked questions related to the nature of the interactions with the artifact, the design of the artifact, and the overall two-week experience of having the artifact in your home.
- During the interview data was collected through audio recordings.
- Following the interview written transcripts became part of the data. You had the right to check the accuracy of the written data and correct any errors or ask for any material to be removed.

Step 4 describes **why I am contacting you now**:

- I would like to invite you to take part in a second interview, a follow-up to the interview we had in February 2018.
- The interview will take about 45 minutes and will take place at your earliest convenience.
- During this interview, you will be asked questions about the adoption experience and the impact that having the artifact in the home had.
- During the interview data will be collected through audio recordings.
- Following the interview written transcripts will become part of the data. You will have the right to check the accuracy of the written data and correct any errors or ask for any material to be removed.

If you have any fragrance sensitivity, or you suffer from fragrance allergies, or if you have any concerns about the use of essential oils in the artifact I recommend you do not take part in this study. If you decide to take part in this study and throughout you notice an allergic reaction please stop immediately the interaction with the artifact and see a physician.

I do not foresee any physical risks in taking part in the study. Although there are no immediate benefits, you may find the interaction with the artifact enjoyable.

If you agree to take part you are asked to sign a consent form.

If at some point, you wish to stop participating in the study, you have the right to do so, without giving a reason and with no detriment to yourself. Also, any information you have provided will not be further considered, and will be destroyed.

Any material you provide as a result of steps 1, 2, 3 and 4 above may be used in written accounts of my research. The results of this study will not be kept confidential, they will be included in my PhD thesis, thus they will be public and will be available to other researchers.

Your identity will be kept strictly confidential throughout this research project. In my writing, I will be referring to you by your role (e.g. participant 1), apart from specific material in relation to which you would prefer to have your name quoted. Any comments made during the interview will be attributed to you.

If you have any further questions about this study or completing the tasks, or if you require additional information please contact me at any time and I will get back to you personally. My e-mail addresses are ebrebenel@nscad.ca and e.brebenel1@arts.ac.uk.

If you would like a summary of the results, please let me know by providing me with your e-mail address. When the study is completed, I will send it to you. The study is expected to be completed by December 2020.

This research has been reviewed and accepted by the University of the Arts London Research Ethics Committee and Saint Mary's University Research Ethics Board. If you have any comments or concerns about ethical matters, you may contact the Chair of the Saint Mary's University Research Ethics Board at ethics@smu.ca or 902-420-5728.

Thank you for reading this information sheet. Please keep this for your records.

O 1 Consent Form for the first adoption experiment



CONSENT FORM

What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Researcher: Elena Brebenel

Statement of understanding

- ☐ I confirm that I have read, understood and have been given a copy of the information sheet provided for the research study. I have had the opportunity to consider the information, ask questions and I have had these answered satisfactorily.
- ☐ I understand that essential oils are part of the artefact components.

Right to withdraw

- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, as well as to deny answering at any question, without any legal rights being affected.

Activity consents

- ☐ I agree to host the artefact in the home for a period of two weeks.
- ☐ I agree to take photographs of the artefact while it is installed in my home.
- ☐ I agree to be audio recorded during the interview.

Data consents

- ☐ I understand that any material given (e.g. audio and visual materials) will be held, stored, used, published, presented and exhibited in the findings of this research and may be used in future research, reports, publications, presentations and exhibitions.
- ☐ I understand that personal details will remain strictly confidential throughout this research project, apart from specific material in relation to which I would prefer to have my name quoted.

Name of Participant	Date	Signature
_____	_____	_____
Name of Researcher	Date	Signature
_____	_____	_____

Participant record

A duplicate copy of the signed consent form will be given to you to keep for your own records.

Contact for further information:

- Elena Brebenel (researcher): Central Saint Martins, University of the Arts London. Granary Building, 1 Granary Square, King's Cross, London, N1C 4AA, UK. E-mail: e.brebenel1@arts.ac.uk
- Research supervisor: Prof Carole Collet, Central Saint Martins, University of the Arts London. Granary Building, 1 Granary Square, King's Cross, London N1C 4AA, UK. E-mail: c.collet@csm.arts.ac.uk
- Research Management and Administration. University of the Arts London. 5th floor, Granary Building, 1 Granary Square, Kings Cross, London, N1C 4AA, UK. E-mail: researchethics@arts.ac.uk

CONSENT FORM

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Director of Studies: Prof. Carole Collet

Research Student: Elena Brebenel

Statement of understanding

- ☐ I confirm that I have read, understood and have been given a copy of the information sheet provided for the research study. I have had the opportunity to consider the information, ask questions and I have had these answered satisfactorily.
- ☐ I understand that essential oils are part of the artefact components.

Right to withdraw

- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, as well as to deny answering at any question, without any legal rights being affected.

Activity consents

- ☐ I agree to host the artefact in the home for a period of two weeks.
- ☐ I agree to take a photograph of the artefact while it is installed in my home.
- ☐ I agree to be audio recorded during the interview.

Data consents

- ☐ I understand that any material given (e.g. audio and visual materials) will be held, stored, used, published, presented and exhibited in the findings of this research and may be used in future research, reports, publications, presentations and exhibitions.
- ☐ I understand that personal details will remain strictly confidential throughout this research project, apart from specific material in relation to which I would prefer to have my name quoted.

Name of Participant	Date	Signature	E-mail address
_____	_____	_____	_____
Name of Researcher	Date	Signature	
_____	_____	_____	

Participant record

- ☐ A duplicate copy of the signed consent form will be given to you to keep for your own records.

Contact for further information:

- Elena Brebenel (Research Student), NSCAD University, Division of Craft, 5163 Duke Street Halifax, NS B3J 3J6. E-mail: ebrebenel@nscad.ca and e.brebenel1@arts.ac.uk. Phone: 902-484-8173.
- Prof. Carole Collet (Director of Studies), Central Saint Martins, University of the Arts London. Granary Building, 1 Granary Square, King's Cross, London N1C 4AA, UK. E-mail: c.collet@csm.arts.ac.uk. Phone: 44 (0) 207-514-7140.
- Research Management and Administration, University of the Arts London, 5th floor, Granary Building, 1 Granary Square, Kings Cross, London, N1C 4AA, UK. E-mail: researchethics@arts.ac.uk. Phone: 44 (0) 207-514-2113.
- Chair of the Research Ethics Board, Saint Mary's University, 923 Robie Street, Halifax, NS B3H 3C3, Canada. E-mail: ethics@smu.ca Phone: 902-420-5728.

CONSENT FORM

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Director of Studies: Prof. Carole Collet

Research Student: Elena Brebenel

Statement of understanding

- ☐ I confirm that I understand what this study is about, and that I appreciate the risks and benefits.
- ☐ I confirm that I have had adequate time to think about the research study and have had the opportunity to ask questions.

Right to withdraw

- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, as well as to deny answering at any question, without any legal rights being affected.

Activity consents

- ☐ I agree to be audio recorded during the interview.

Data consents

- ☐ I understand that any material given (e.g., audio) will be held, stored, used, published, presented and exhibited in the findings of this research and may be used in future research, reports, publications, presentations and exhibitions.
- ☐ I understand that personal details will remain strictly confidential throughout this research project, apart from specific material in relation to which I would prefer to have my name quoted.

Name of Participant	Date	Signature	E-mail address
_____	_____	_____	_____

Name of Researcher	Date	Signature
_____	_____	_____

Participant record

- ☐ A duplicate copy of the signed consent form will be given to you to keep for your own records.

Contact for further information:

- Elena Brebenel (Research Student), NSCAD University, Division of Craft. 5163 Duke Street Halifax, NS B3J 3J6. E-mail: ebrebenel@nscad.ca and e.brebenel1@arts.ac.uk. Phone: 902-484-8173.
- Prof. Carole Collet (Director of Studies), Central Saint Martins, University of the Arts London. Granary Building, 1 Granary Square, King's Cross, London N1C 4AA, UK. E-mail: c.collet@csm.arts.ac.uk. Phone: 44 (0) 207-514-7140.
- Research Management and Administration, University of the Arts London, 5th floor, Granary Building, 1 Granary Square, Kings Cross, London, N1C 4AA, UK. E-mail: researchethics@arts.ac.uk. Phone: 44 (0) 207-514-2113.
- Chair of the Research Ethics Board, Saint Mary's University, 923 Robie Street, Halifax, NS B3H 3C3, Canada. E-mail: ethics@smu.ca Phone: 902-420-5728.

ADOPTION FORM

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Director of Studies: Prof. Carole Collet

Research Student: Elena Brebenel

Please fill out this form as thoughtfully as possible. Each application is carefully considered.

Name:

E-mail:

Date:

Please see below examples of possible artefacts you might get to adopt:



How much time do you anticipate to spend at home for the duration of the two weeks you would have the artefact in your home?

.....
.....
.....

Are there any pets in your household? (If yes, what are they?)

.....
.....
.....

Why are you interested in having an artefact like this in your home?

.....

.....

.....

.....

.....

Do you have any similar objects in your home? (If yes, could you please describe them briefly?)

.....

.....

.....

.....

.....

Where in the home you might place this artefact and why would you place it there?

.....

.....

.....

.....

.....

How much attention do you pay to your home and what are the ways in which you are doing this?

.....

.....

.....

.....

.....

What interests you about this research project?

.....

.....

.....

.....

.....

I would be grateful if you would please return this within 48 hours of receipt
Please send it to ebrebenel@nscad.ca or e.brebenel1@arts.ac.uk



RECRUITMENT EMAIL

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?
Director of Studies: Prof. Carole Collet
Research Student: Elena Brebenel

Subject line:
Invitation to participate in a design research study

Message body:

What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

You are invited to take part in this research project whose aim is to identify the potential that bioinspired textile artefact have in raising awareness about elements of the home environment readily accessible to our senses. Elena Brebenel, PhD student at University of the Arts London, UK and Assistant Professor of Textiles at NSCAD University, Halifax, Nova Scotia is the researcher requesting your participation.

Please see Participant Information Sheet attached for details about this research project.

Participants that are single people or couples with no children in the household are eligible to take part in this study.
The artefacts utilize essential oils of lavender (*Lavandula officinalis*) and pepper mint (*Mentha arvensis*). If you have any fragrance sensitivity, or you suffer from fragrance allergies, or if you have any concerns about the use of essential oils in the artefact I recommend you do not take part in this study.

To express your interest in taking part in this research study please contact Elena Brebenel at ebrebenel@nscad.ca or e.brebenel1@arts.ac.uk by MONDAY, January 22, 2018.

I look forward to hearing back from you.

Sincerely,
Elena Brebenel

Assistant Professor of Textiles
Division of Craft
NSCAD University
5163 Duke Street
Halifax, NS B3J 3JB
Phone: 902-484-8173
E-mail: ebrebenel@nscad.ca



FOLLOW-UP INTERVIEW EMAIL

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Director of Studies: Prof. Carole Collet

Research Student: Elena Brebenel

Subject line:

Follow-up interview to the design research study

Message body:

Dear Participant,

I hope this email finds you well.

I would like to thank you once again for agreeing to take part in my research 'What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home?'. I appreciate very much your contribution to this project.

I am emailing you because I would like to ask you if you could spare about 45 minutes to answer a couple of questions, as a follow-up to the interview we had in February 2018. During this interview, you will be asked questions about the adoption experience and the impact that having the artifact in the home had.

I have attached to this email the participation information sheet which contains details about the project, in regards to what you already did and what I am asking you to do now. Please let me know if you have any questions and I will be happy to answer them.

Could you please let me know of your interest and availability?

I look forward to hearing back from you.

Sincerely,

Elena Brebenel
Assistant Professor
Division of Craft
NSCAD University
5163 Duke Street
Halifax, Nova Scotia, B3J 3J6
Canada

Appendix R – Interview Transcripts

R 1 Interview transcripts from the first adoption experiment

R 1.1 Interview with P 1.1 adopting *Home Pharmacy* Transcript⁶³ [29 August 2017]

R = researcher

P 1.1 = first participant from the first adoption experiment

1st RECORDING

1. R: When you talk to your friends or other people about the artefact how would you describe it?

P 1.1: It is a research activity based on printing and textiles and related to organic and nature.

2. R: Where in the home did you place it? Why did you decide to place it there?

P 1.1: I put it in my room because it is the only place where I have a little bit of white space. Everything else is full with books, and pictures and frames. So, that was the only place. It was a practical reason.

3. R: Do you think the placing affected the way you engage with it, and if so, in which way?

P 1.1: No. I don't think it made a difference.

R: Do you think that if you were placing it maybe in the living room or the corridor, or some other place, do you think this would have changed?

P 1.1: Maybe if I had it for two weeks, because I only had it on my wall for one day.

R: You didn't put it up when you received it?

P 1.1: No, I was really busy with work. I had so much work in the last few weeks. I had a lot of deadlines. So, I completely forgot about it. And, then the other day I was like 'oh, I should do that'. And, I did not understand that I needed to have it for two weeks. I did not know that. I thought it was like an activity for a couple of hours or something like that. I didn't know I have to engage for a long time.

4. R: What did you use it for apart from what the instructions were? Did it play any other function in your home life?

P 1.1: No, not really.

5. R: For how long and how often did you interact with the artefact?

P 1.1: I think it was a couple of hours, more or less.

6. R: How did you find the activity? If you are to refer simply to what you were asked to do, what would you say about it?

P 1.1: I think it was fun. I think it was very nice in the sense of how it was presented and the craft, and the details of everything. I think that was fantastic. I think it was nice to do it for a couple of hours. Just to do that and not something else. I didn't engage with it in any other way.

R: You said you had it up for a day and you spend a couple of hour on it. How did you perceive that activity? Because you said it was fun, so if you were to say an equivalent for that activity, what would be the equivalent?

P 1.1: A wall poster puzzle.

7. R: How did you find the timing of the interactions? Do you think they should be shorter, they should be longer? You had to put things on the piece. I guess that would have had more sense if you have had it for two weeks, because then you could have compared different days. But, can you give an answer to this?

P 1.1: I had it for one entire day, for 24 hours. I didn't have two experiences to compare. I worked with it in the morning and then I did other things later. I didn't come back to it.

R: Could you comment on how things would have been different if you had it up for two weeks?

P 1.1: I don't know. I don't come very often to my room. I come to sleep and then I leave and I never come back during the day. So, probably very little. If I had it in the living room, probably there would have been a little bit of interaction. Maybe managing a few things or smelling to see if it still has a smell.

8. R: Did other people interact with it, apart from you?

P 1.1: My flatmate came to look at it and helped me to put one or two little things on there on the wall.

⁶³This interview is comprised of two recordings, because the internet connection was lost after a few minutes into the interview.

R: What did she think about it?

P 1.1: She thought that it was fun.

R: Can you talk a little bit more about that? About her interaction with it and apart from being fun, what exactly about it was fun?

P 1.1: She likes puzzles so she enjoyed doing something similar.

9. R: For how long did you have it in your home before you interacted with it? And, after you interacted with it, were you more inclined to want to engage with it again, or not? How did you find the whole activity? Was it exciting? Were you like 'oh, I could do this for a while', or you were like 'okay, it's about putting things up and that's it'. Did you feel it was engaging or not?

P 1.1: I had it for two weeks, but it was in a box.

R: How long was it? 12 days out of the 14 days?

P 1.1: Yes, something like that. At first, I wasn't really sure what this is. I asked myself 'is this a puzzle, is that what I have to do?'. But after I started it was kind of exciting to do it. Just not doing anything else. Yes, I liked that. There were mixed feelings. At the beginning, I was more like 'oh what is this?' and later it was 'I like it'.

R: Was it just one block of time when you interacted with it?

P 1.1: Yes.

R: How long was that?

P 1.1: About two hours. It is in the notebook.

R: When did that interaction happen?

P 1.1: At 12:30 PM.

R: What guided your decision in stopping at that time and interact with it? What made you stopping what you were doing to do this thing?

P 1.1: I planned to do it on Saturday. It wasn't spontaneous. It was planned.

12. R: Do you remember what the artefact is about according to the description in the information sheet? And, do you think that has any importance, the story behind the artefact?

P 1.1: Yes, the bird makes the nest and it is able to decide what is good for her and the little birds. What might be poisonous or something like that. So, she knows by instinct what is not right.

R: Do you think that the fact that the narrative comes with it has any importance? And if so, in which way?

P 1.1: I think it might have for the big picture of the research. In regard to the activity it creates a sort of atmosphere, but it doesn't help with the activity itself.

R: Did you see any connection between those two?

P 1.1: At some point, I wondered 'why do I have two options? Am I like a bird and I have to know which one I should choose?'. It is the notebook actually.

R: You were trying to make some sort of connection between the story and what you were doing?

P 1.1: Yes, at some point.

13. R: The loose fragments were impregnated with essential oils. What do you think the role of the oils is?

P 1.1: Well, I guess if I were a bird it would help me find out what has poison and what hasn't. But I am not a bird, so I am not sure.

R: What it did for you, the fact that they were impregnated with oils?

P 1.1: As part of the activity I am not sure either. As for my personal experience, it was interesting. Because I never had something similar and I am not a very scent-oriented person. At the beginning, it was nice. At some point, it was a little bit too much. I was getting a little bit overwhelmed with so many scents and smells. So, maybe if you do this during two weeks it wouldn't be so obvious. But I did it all together and I had all of them out, so it was.

R: You said you are not a scent-oriented person and you don't normally have scented objects.

P 1.1: No. My roommate has scented candles, and I am always complaining about it.

R: In the long run, let's say hypothetically, if you were to be give a piece like this that would have oils, papers impregnated with oils, would it seem like something you would keep?

P 1.1: Probably not. It is not my thing. I like the smell of lavender, the natural smell, and the plant. But everything that is impregnated with scents I am not that keen.

R: Do you think it was also because it was quite intense, the scent, because you put so many up?

P 1.1: Maybe. But I think it was because I was handling them. Because when I came back to my room it wasn't a scent going on. I didn't come in and said 'oh, there are some new things going on here'. So, it was only when I was actually handling them.

R: Did you like the fact that these pieces were impregnated with oils?

P 1.1: I did like it.

R: What do you think this added to the whole engagement, interaction with it. Let's say they weren't impregnated. (There were actually some that weren't impregnated with oils, but others were.)

P 1.1: I don't think that changed the engaging with one or the other. I think it was more like a general thing. I didn't like one more because they had oils in them and I didn't dislike the others because there was no oil. I didn't make that difference.

R: Do you think that if the scent wouldn't have been there would it change in any way the interaction, the engagement?

P 1.1: I think so. The fact that there was some scent was adding context, or atmosphere to the whole thing. Like the story. It made it a whole. Of course, I smelled each one, but I didn't think 'oh, I prefer this, or I prefer this one'. That's not how it was. It was like a context.

R: Apart from the fact that is creating some sort of atmosphere, did it do any other thing?

P 1.1: Not to me. Not really. I didn't see those things connected straight away.

14. R: The artefact references the flora of the natural world, how did the artefact fit into your home from that perspective? And what did this particular imagery made you think of?

P 1.1: Not that I thought about that in that moment, but it fit. My room has a few plants. I have a few plants in my living room and there are a few plants outside. I am not going to say that the house is like a natural world because that would be a lie, but I think some natural references could perfectly fit in the house. Also, I didn't think of the imagery as a nature part of the world. I was thinking of it more in terms of the process, of how you did it and how you printed it.

2nd RECORDING:

15. R: What did you think of the scale of the artefact and was it easy to find a spot for it in your home?

P 1.1: It was a tiny bit big for a small house full of books. I couldn't really attach it to the wall. I have a wood panel, so I attached it to my own panel, and that was hanging it.

16. R: What do you think about the installation? The way you had to put it up?

P 1.1: I thought it was quite clever. But I couldn't use the nails. I tried to use one of the little nails on my wall and they got completely bent. So, I thought 'okay, I am not going to try this' and I found another solution. But, I thought it was clever and I thought it was very nice that everything was supplied. It also depends on the wall. Some walls are softer, so the nails would be enough, but my walls are brick so there is no way to put them in.

R: Do you have any suggestions on how would you like this to be displayed, or installed in a different way?

P 1.1: I think is very particular of the place and where you are going to hang it. And, it depends if you are going to have it for a couple of weeks or for one day or it's going to be there longer.

R: Let's say you have this for a couple of years, how would you display it?

P 1.1: I think I will try some another solution. Like those panels that are hanging at the college in the window displays. There is some kind of hanging system there. Maybe something like that. Hanging from the ceiling because in this way you can decide which position you want it displayed in.

17. R: How did you find the packaging?

P 1.1: Even though it took me two weeks to open it I think the presentation was really good. It was like a little present. You really wanted to open it and every detail was really very accurate, and very nicely done. So, in that sense in was engaging.

R: Did it come with a sense of surprise? Did it give you any idea of what may be inside?

P 1.1: No, I had no clue.

18. R: This question it's about the level of (craft) skill that the engagement with the artefact involved. Do you think that was appropriate? Do you think that was appropriate? Do you think it should require less involvement, or more? Do you think that was enough or appropriate as an activity?

P 1.1: I think it was okay for an activity.

R: Did you have moments when you were feeling it is work, because you are struggling because you didn't know where to put them or it was more like a flow?

P 1.1: There were mixed feelings. The first was finding out what it was about. That was very difficult, but then you realize it is like a puzzle so you have to put the little pieces in place. I started with the big ones. With the big ones it was easy, like filling the blanks because I knew how to do it. Then I tried, I think it was the lavender, and it was a bit frustrating because I couldn't find where they went. So, I moved on to something easier, which made me happy again. Then I went back to the lavender which I could find, because once you start doing it, in a way you look at it in a different way. The more you look at it the more you see spaces and forms. So, it is easy to work with it.

19. R: While you were putting these things up and you were looking for the pieces, what were you thinking of? What was going through your mind?
- P 1.1: Many things. I was thinking of the little piece, literally like 'where this one goes?', and I was trying to find out the bigger picture of the whole research, which obviously just by seeing an activity makes it very hard to connect it to the whole research. I guess, there like two brain activities, two levels.
20. R: Did interacting with this artefact triggers some sort of discovery? Some sort of realization? Did you discover something while you were doing the activity?
- P 1.1: Not really. I was just questioning. There are a few questions in the notebook.
21. R: Do you think your actions have an impact on your home environment, and if so what is the impact? These actions that you did, this placing, do you think that it has an impact on your home?
- P 1.1: No, I don't think so. I don't see the connection.
22. R: Where there any actions that occurred as a result of these interactions? Did you start doing something else as a result of that interaction?
- P 1.1: No, there were no actions that occurred as a result of these interactions, and I did not do starting anything different.
23. R: How often do you pay attention to the level of dust in your home? With reference to the last two weeks?
- P 1.1: Like how dusty the house is? That takes a lot of time of my brain because it is very dusty. No matter how much we Hoover. It's all dusty.
- R: So, you pay a lot of attention, in general?
- P 1.1: Yes.
24. R: How often do you open your windows?
- P 1.1: Every day.
25. R: Did you notice any mold in your home in the last two weeks, and if so, do you do anything to prevent it?
- P 1.1: No, because it is the summer.
26. R: Do you have any concerns, also referring to the last two weeks or mostly to the day you had it up, in regard to the fumes produced while cooking?
- P 1.1: No, I don't.
27. R: What do you think when you use paints or solvents in your home?
- P 1.1: That is has to be a sunny day, so that I can do it outside.
- R: So, you don't use them in your home?
- P 1.1: No. I don't normally do it inside if it's possible.
28. R: What did you think of the artefact when you read the information sheet? That is, before you received it, when I first sent you the information sheet in which it was described the project and what you were required to do. Did you have any expectations on what you are going to receive?
- P 1.1: I don't remember what I thought.
- R: What was your reaction when you opened the box to install it?
- P 1.1: I was surprised. It looked very well done and very well printed. I was surprised in a nice way.
29. R: What kind of people do you think might want to own an artefact like this and why?
- P 1.1: I don't know. It is like a general activity that I think anyone could engage with it. I don't see like a particular kind of people.
- R: So, the general public?
- P 1.1: Yes.
30. R: If you were to give the artefact to someone, what would you tell that person? What would you tell it's about?
- P 1.1: I would give it to someone with stress and I would say 'take this, because while you are doing this, you are not thinking of anything else, so maybe will help you forget about work' or something like that.
- R: Would you say anything else?
- P 1.1: No, I would say it is something like a puzzle, related to nature. But, I wouldn't give much more information. If I have to, I would say 'it's sort of a puzzle, related to nature and scents'.
31. R: What was your favorite part of this whole experience?
- P 1.1: The activity itself.
32. R: If you were to think of the overall feeling this gave you or the thought, what would you say that was?

P 1.1: I might be a little bit of a plain person, but I don't know if I have like an overall feeling. Let's say it was a bit exciting. To do it, to see what it was. And it was easy. You sent it, your sister came here, she collected it. It was very easy. The practicalities were easy.

R: What would you say your state of mind was during the engagement, or after the engagement with the artefact? What was happening in your mind at that time?

P 1.1: I was trying to find out what the activity was, and I was doing it and I was excited to see what was about, and it was fun. And after, nothing related to the activity itself. I don't think it changed my mood or what I was thinking. Or while I was doing.

R: Did the state of mind that you got into while doing it continue, or it ended when the activity ended?

P 1.1: It ended with the activity.

R = researcher

P 1.2 = second participant from the first adoption experiment

1. R: When you talk to your friends or other people how would you describe the artefact?

P 1.2: It's a fabric you put up on the wall that has flowers with scent.

2. R: Where in the home did you place it? Why did you decide to place it there?

P 1.2: We decided to place it where it would fit, so that was our criteria for this decision because it was quite large, so we put it in the living room, in the biggest wall we have in the living room, that was a wall that did not have anything on it. It was really a matter of space. We also considered the corridor, but then I thought we couldn't engage with it visually, so our living room is a big space with lots of light so we thought it would be better to put it there where we have to look at it more often than the corridor, which is a passage place. Those were the only two places where it would fit.

3. R: Do you think the placing affected the way you engage with it? and if so, in which way?

P 1.2: Yes, I think so. Because we spent most our time during the day in the living room, so it was actually in the room where we spend most time. I think if it was in the corridor, although we might smell it, it wouldn't be something that we would engage with so much, because we just pass there while we are going to the kitchen and back towards the living room, or to the toilet and back towards the living room. So, at least visually, we had the time to engage with it quite often because we spend a lot of time at home, and a lot of time in the living room.

4. R: What did you actually use it for apart from what the instructions were? Did it play any other function in your home life?

P 1.2: Not sure. I think that initially, we thought we should engage with it, like, we must because we knew we were being part of a study. I don't know if that would have been different if we didn't know. I think that sometimes we stopped to smell it...not very often. But, on occasion we would stop to smell it directly from the place we decided to place the flowers. So, to see if the scent was stronger if we would smell the flowers. Other than that, it was just looking at it, while we sit on the sofa because we have no television and, our sofa is right in front of that wall. So, a lot of times we were just looking at it and it's pleasant to look at because it is not very invasive, it's quite discrete.

5. R: For how long and how often did you interact with the artefact?

P 1.2: Well, I think that we engaged with it when we put it up on the wall, and at that time I decided we would put just one flower up because I am very sensitive to smells, and I thought 'oh my god this might be really strong' and I get all these allergies and headaches, and so maybe we just put one flower up. So, we tried that and it was very discrete smell, so I thought that it would be perfectly safe. I don't know how many days after (that would be in the log I think), but I think three or four days after I decided to put other flowers up and I put all the other flowers up. I have to say that, we encountered a couple of technical issues, so, we decided to replace the threads. Instead of placing the flowers with the thread we just pinned them. Because we thought it was very complicated to do it with the thread.

So, we just pinned them in the places that we thought were right for them, and so by that time we had all the flowers in place, so the smell was not as strong as I thought it would be because I was scared initially that it's going to be very strong smell and I am going to have headaches, and it was not at all like that. It's very subtle smell, so I think that after that we kind of engaged sometimes just by passing by and smell it closer but not very often. So, it kind of blended in with our home scape. So, it became part of it in a way that, it kind of disappeared. When we would sit on the sofa we would look at it and engage with it visually, but other than that it kind of became part of our home and we kind of forgot about it.

6. R: How did you find the activity (what you were asked to do)?

P 1.2: When we opened it and saw the instructions we tried to follow it very carefully, but very soon I think we engaged in our own way of putting it up, our own way of putting the flowers up, and then also I think that our own way to engage with it in our daily life. Because we are always very busy and always in a hurry, I think we didn't engage as often with it as we thought we would. When it arrived, we thought that it would be something that we would engage more with, I think. And then, you know daily life comes and we didn't feel that we engaged enough with it. We talked about it when we received the email saying 'oh, this is coming to an end'. We talk about it and said to each other that 'oh, we didn't engage with it that much'. But then I was thinking about it and when you asked that question, I think that is what happened, that it blended in with our

usual furniture, and it fits very well with the colours of our house. We have an off-white wall, not a really white wall, like a creamed coloured wall and it's just blended in and it became kind of invisible, although when we look at it visually we thought 'oh yeah, I should smell it' and then we would sometimes stop to smell it but not very often. So, that's how I feel, that it becomes maybe a bit too invisible. I don't know what is supposed to become, so I thought it becomes really embedded and sort of invisible and part of our usual home. So, it is not disruptive at all of our daily lives, and somehow, I think that maybe it could be a little more. We could deal with a little more disruption from it because at a certain point it became just invisible. But I do not know if that was the purpose, so maybe the purpose of it was that it would completely blend with your life and in that case, it did, it completely blended with our daily life, until it became like the other things we have here in the living room.

7. R: How did you find the timing of the actual interactions? Did you wish they were longer, shorter?

P 1.2: Yes, it was short, I think.

R: Okay. So, how long would you have preferred to be? Because they were different, right? Some of them required a certain kind of interaction, and the other one a different kind. Is there any that you preferred more?

P 1.2: I think that everything could have been longer because we don't have much time. Because we are so busy we needed more time to appreciate it more. Not entirely sure of this but I think that if everything could take longer that would be good.

R: You mean when you unstitch to take longer? Because that was what I was referring to. Because, I get a feeling you were meaning the time you had it in your home.

P 1.2: Yes, I meant the time I had it in my home. No, about the unstitching it was okay. I thought it was simple, it worked quite well, and it was long enough and it was not complicated. What I thought it was really complicated and we just ended up ignoring was the way it had to be placed, like the way you would have to use the thread to connect it to the bigger piece. (It) kind of drove us nuts, and we just ignored it and used pins. Because it was taking long and was becoming complicated, we ended up not doing it that way.

8. R: Did other people interact with it apart from you and J?

P 1.2: No. No visitors during these two weeks.

9. R: For how long did you have it in your home before you interacted with it? And after you interacted with it the first time were you more inclined to want to engage with it again? or not?

P 1.2: We interacted with it right away. The second time was after four days. I am pretty sure.

10. R: When you interacted with it the first time did it get you excited to want to do it again? Or, you were kind of like 'okay that's it, I am just going to put it up'.

P 1.2: No, I think that happened the second time, not the first time.

R: Okay, so the first time was kind of exciting.

P 1.2: Yes, exciting.

11. R: When were you most likely to interact with the artefact, in terms of moments of day, times of day? And, what really guided your decision in stopping just for a moment and interact with it?

P 1.2: That was mostly guided by the times we are not working. So, the most common times would be end of the morning when we usually take a break, or late afternoon, when we also stop to eat or something like that. We would sometimes stop and go smell it during that time.

12. R: Do you remember what the artefact is about according to the description in the information sheet?

And, do you think that has any importance, the narrative behind the artefact. And if yes, in what way?

P 1.2: Actually, not very well.

R: Do you remember anything?

P 1.2: I just remember it was about scent, and that it had lavender and peppermint scent. Yes, it was the bird story! It's a bird that uses it in its own nest. I actually remember it a little bit. It's really far in my mind, even though it's just two weeks ago. Yes, the bird which I don't remember the name of anymore, makes its nest using elements of lavender and peppermint to make it more hygienic, I suppose to avoid bacteria. I think that's what I read.

R: Yes, you are correct. That's what it is.

P 1.2: It was very far in my brain, it was totally archived. I had to go back to my brain's archives to get that information.

R: Throughout the time you had the artefact did you make any connection between the story and the artefact?

P 1.2: No. There was just the last conversation, when we received the message saying that it was over. When I was talking to J and we were discussing it together we finally referred back to it, but not during the whole time. Only when you contacted us again, and you said it's over, and we thought 'oh my god, it's already over. It was really quick.' And, we started talking about it and we were trying to figure out if it made a difference or

some kind of impact in our lives. And we referred back to the story and we discussed it, and we tried to figure things out, like, 'oh but if it's for a nest maybe we would have to have all walls covered in it'. We speculated a bit what the story is meaning.

We are both artists so we discussed 'oh maybe it should have much more of that materials, maybe would have to be something that would cover all our walls'.

R: What kind of material?

P 1.2: Because we were referring back to the story of the bird and we were saying 'okay, yes I think it's supposed to be something that birds put in their nest', that's what we were talking. And then we said 'maybe it has to be much more because we barely felt the scent, it was very, very subtle'. And then we were speculating on it, and we discussed saying 'maybe it would have to be something like wallpaper, or something that you put all over the walls'. If you think of the percentage of the material it would be in the nest and how much we would need to have to feel the difference in our home.

13. R: The loose fragments were impregnated with essential oils. What do you think the role of the oils is?

P 1.2: I thought it was to make our house better in some way. I wasn't sure if it was to make it cleaner, or just smelling better. We were not sure what these oils do. The first thing I said to J and he wrote it down in the little book was that I remember that mice hate peppermint scent so we would definitely avoid the presence of mice. We just assumed that they will have some kind of beneficial effect on us but we didn't know what it was.

R: Did you like the fact that they are impregnated with oils?

P 1.2: Yes, at the beginning I was very skeptical because I usually don't like scents, perfume in general but I thought they were very pleasant. They are subtle scents. I was expecting them to bother me and they didn't bother me at all.

14. R: The artefact references the flora of the natural world, how did the artefact fit into your home from that perspective? And what did this particular imagery made you think of?

P 1.2: I hadn't thought about that at all during the whole time. Now, that you mention it, it does make me think about nature, I don't know if it's because of the elements that are represented, but it does remind me of nature, and it has some kind of calming presence. I don't know how to explain that. I don't know why is calming and relaxing, but maybe it's the colours, the use of very light colours. I don't know why but I think it has some calming presence. I don't know if that is its relation to nature. The elements remind me of nature.

15. R: What did you think of the scale of the artefact and was it easy to find a spot for it in your home?

P 1.2: Size it was not very easy, because it was quite large, and we actually have free space in our home but we are not allowed to put things up, so that was a bit of an issue. We ended putting it up with the pins that you gave us, the little ones. I mean, I liked that it was large, aesthetically it was not a problem. It was more a matter of space. It was hard to find the space for it, a spot that does not have bookshelves to put it up. It demands a large portion of wall. But aesthetically, like I said before it fitted in very well. It blended it because it was close to the colour of the walls we had, so it became very easily a part of our environment. It was in tune with the rest.

16. R: What do you think about the installation? The way you had to put it up? Do you have any suggestions on how would you like this to be displayed, or installed in a different way?

P 1.2: It was very complicated. We really hated the little pins, or nails or whatever they are. They are really short and they were really complicated, even for me. For J were impossible. But for me it was very hard to hammer them and they would fold. I don't know if it's the same for everybody, but we have stiff walls. I think maybe particularly stiff walls. I don't know exactly what to suggest, but if it could be something that could be put on and take out easily. You know, something more temporary. I think I would prefer that.

R: Hypothetically speaking, let's say you get this for yourself and it's a permanent thing. How would you like that displayed? Let's say you have it for a couple of years.

P 1.2: Maybe it could be something that just demands like two little holes one on each end, but I am not sure that is even possible. It was definitely not something that we liked, the way we had to put it up. And we found it very complicated to put those little pins in.

R: Do you see that being used as something else than just hanging on the wall?

P 1.2: Maybe it could be something like the Chinese screens with fabric and a frame. Something that you can open and close somehow, but still put in your home.

17. R: How did you find the packaging?

P 1.2: Ah, it was great! Beautiful!

R: Did it stimulate in any way the engagement with the artefact?

P 1.2: Yes! It was gorgeous. It was very nice, very, very big fan of the packaging. We thought it was beautiful.

R: Did it come with any sense of surprise?

P 1.2: Yeah, definitely.

R: Any other comments on the packaging apart from 'it was beautiful'?

P 1.2: It went a little beyond its purpose. So, the purpose was to protect it and carry it, but the materials indicated what you were going to receive. It had some kind of relation with nature, and a certain sensibility in the materials. I thought it was very delicate, so it felt like you were dealing with something precious that needed to be very well protected. So, it puts you in a certain mood, because you feel that is delicate, and it's something that was carefully packaged so that sense extrapolates for the activity. It makes you think it should be carefully done and like I said that is something precious.

18. R: This question it's about the level of craft skill that the engagement with the artefact involved. Do you think that was appropriate? And do you think it should require more involvement, less involvement?

P 1.2: I think it was a bit too demanding. It was a bit elaborate. With the threads like I told you it was really complicated, and I think we don't have much time in daily life, so I ended putting it up just with pins. I have these very fine pins. I left them in place because I did not know if you wanted to see it as it was. So, I left my pins there and I folded it with the pins in.

I felt the threads (I am actually a person that works with thread, but maybe because of that) were too complicated it, so I just moved on to placing it easily with pins, and I thought that worked out quite well. It didn't bother me because I have these very fancy black pins, so I thought aesthetically it didn't disturb it. The thing you had to do with the threads it was a bit complicated, and sometimes the thread would break too, so that demanded some skill.

To open up the flowers, to take the thread out, that was okay. That worked well. I could do it easily. But it did demand for me to pull the thread out. I don't know if that is completely straightforward. It was also, difficult to hang. I think it demanded more skills than I expected. I expected it to be more straightforward.

R: Could you think of any similar actions you would like to see translated in a textile artefact like that? You already said the pins, so you came with an alternative, you used the pins. For example, you had to pull the thread for the crocheted piece and you had to un-stitch for the stitching, can you think of any other way you would do this, or while you were doing it, you were like 'oh maybe this would work'. Do you have any suggestions or ideas, different ways in which those can happen?

P 1.2: I think the way the stitching was used to separate the parts, I think it works well, it is simple enough and it functions. Maybe the thread has to be more resistant. It should be polyester thread, because the thread breaks sometimes when pulling it so, I thought that could be an option. Although I think it's very smart the way it's put together. Because is very simple and easy enough, and common enough for other people to know how to do it. Because it happens to everyone, at some point your clothes fall apart, with the thread coming out so that is something I am sure everyone is familiar with. So, I thought that was very smart. Very smart way of putting it together. I thought the tying up system definitely did not work for me. I was not patient enough to do it. And I am used to that kind of things, but in my daily life I definitely don't have the availability to think 'oh, now I am going to take all this time to do this' that would just wreck my nerves. I am too of a stressed person to stop and do something fun, unfortunately. Because, it made me realize how unavailable I am for slow activities. I find that unfortunate. That was definitely true, that I did not have enough availability, so I thought 'oh, why don't I do this with pins! That is super easy, I just pin it down' so, I ended up doing it that way.

R: So, the tying stopped you from interacting, it worked the other way around because you were kind of dreading it a little bit until you found an alternative, right?

P 1.2: Yes.

19. R: What did the activity make you think of? What did the unstitching, pulling the threads, putting the things up on the piece make you think of?

P 1.2: To me, it feels a little bit like work, because I work with that sort of material. So, it related to work because I had to do things with thread and fabric. But definitely the scent, the relation with smell sent me elsewhere because that is not something that I have in my life at all, I don't have much of an engagement with scent. Because of my allergies, I do not have things with perfume usually or anything like that. So, that was unfamiliar territory and it made me think of nature.

20. R: Did you discover anything upon physically doing the activity? In the act of doing, did you discover anything? The thoughts you had did they trigger any sort of discovery?

P 1.2: It's hard to say in retrospective, I think it was more that feeling of harmony. I can say that it was something comfortable, and it was related to comfort and to something in harmony, but I don't know exactly why it makes me think about those words. If I think about what triggered, those are the thoughts that I could say related to the artefact.

21. R: Do you think your actions have an impact on your home environment and if so what is the impact?

P 1.2: I think my actions always have an impact on my home environment. Do you mean, putting the piece on the wall and relating to it?

R: And, interacting with it. The actual act of interacting with it, does it have an impact and if so, what is that?

P 1.2: I don't know if it has an impact. It seems quite a strong word, I think that of course it had a presence somehow, but I felt that this presence was very discrete like I said before. So, I think it became very quickly part of our home environment. And so, I don't know if I can talk about an impact of it because I think it just blended it. I don't know if I can recognize some kind of impact.

22. R: Where there any actions that occurred as a result of these interactions when you had the artefact? Did you start doing something else as a result of that?

P 1.2: No, I don't think it was enough time for that.

23. R: How often do you pay attention to the level of dust in your home in the last two weeks?

P 1.2: I'll tell you a little story because this might be interesting: when we took your piece down, it was completely covered with dust on its back and it was disgusting. And me and J commented on it and we said 'oh my god, we totally don't clean our house. We have so much dust. Look at it! Now we got it all dusty!' and we had to clean up your piece because it was completely, I mean really full of dust. So, it made us realize we had a very dusty home.

R: That was at the end when you had to take it down, but the time you had it up did you pay attention to that? Did you notice any of that?

P 1.2: We didn't notice at all. We just realized it when we took it down.

24. R: How often do you open your windows?

P 1.2: Very often, every day we open them several times a day. They are usually always open.

25. R: Do you notice any mold in your home, and if so, do you do anything to prevent it?

P 1.2: No, there is not much humidity. There is a bit in the bathtub.

R: Do you do anything to prevent it?

P 1.2: No. We try to clean it when its moldy. Not as often as we should though. Luckily, we have a house where there are no humidity issues at all. We just have a very dusty home.

26. R: Do you have any concerns, also referring to the last two weeks, in regard to the fumes produced while cooking?

P 1.2: Yes, it concerns me because we don't have a good ventilation system. It gets very smoky very easily, so we have often kitchen smell.

R: But, is this something that you normally pay attention to?

P 1.2: Yes, it's something that I always pay attention to. Maybe I reflected more on it, because I had to think about scent.

27. R: What do you think when you use paints or solvents in your home?

P 1.2: I don't used them at home.

R: Why don't you use them?

P 1.2: Because I am very concerned about my allergies, so I am very worried for getting allergies from it. So, I avoid as much as I can to have that kind of material being used at home.

28. R: What did you think of the artefact when you read the information sheet? Before you got it. When I sent you the information sheet where it was said what you are going to receive and what you are supposed to do, what did you think, what did you expect?

P 1.2: Because I know your project from before my opinion was strongly based on that, so I didn't have many expectations, so I thought 'oh, it's going to be the same'. When it arrived, I was very surprised, because I thought it was a big departure from the previous one. The elements where a lot more abstract. Visually, I thought it was something nicer to put up on my wall. Because it was not like an illustration of flowers anymore. It was more like an abstract painting, but with elements that referred to flowers, so I thought it was a much more interesting development, visually. And, I really enjoyed the colours because they were very faded colours, very subtle and they blend in with my wall colour. So, it surprised me in that way, that it was such a subtle delicate choice of colours, and I quite liked the colour choice being faded out.

29. R: What kind of people do you think might want to own an artefact like this and why?

P 1.2: Maybe people, that have some interest in arts, because in a way it is like putting up a painting on your wall, although it has other features, that relate to other scents, that are not purely visual. But I think you have to have some kind of predisposition to want to have an artistic element on your wall.

30. R: If you were to give the artefact to someone, what would you tell that person? How would you describe it? How you talk about it?

P 1.2: I would say that is a 'painting that you could smell'. I would explain 'it works a little like aromatherapy, it can change your environment in the same way that incense does, or something like that'. Although it is not accurate.

R: Let's say you were giving it to your mom. You had it and you were giving it to your mom.

P 1.2: If I was giving it to my mom I would definitely say it's a painting you can smell, and it can improve your home.

R: You referred several times to this idea of improving the home. What are you basing this on?

P 1.2: It makes it more pleasant.

R: What made you think that it improves your home? How did you get to this conclusion?

P 1.2: It's nice, it's pleasant to be in the presence of it, it's got nice colours, it looks good on my wall, and I like the idea of having something that smells nice on my wall.

R: Okay, so it improves it from that perspective.

P 1.2: I didn't feel that it makes my house cleaner. I don't know if it is supposed to. I don't know about that. I didn't think my house is healthier, or cleaner. Did it make my house cleaner, or less smelly? I don't know about that. All the interactions with it were more sensorial and less of an hygienic, health perspective, that is why when I discussed it with J we were saying 'oh, maybe it needed to be much more' because we were wondering if that was a matter of amount, like if we had much more. But then I was worried because of the allergies. It would it be something that would become unbearable, or maybe give me headaches if it was much more, so I really had thoughts in relation to that.

R: You said something interesting earlier, you said 'sensorial experience'. Can you talk more about that? Because you said that is how you perceived it, right?

P 1.2: Yes, because it was something that I could engage with in my house. I don't know, it was obviously different from not having it. So, the way its presence was felt, was by visually engaging with it, so by spending some time looking at it, which would happen. And also by feeling the scent of it. In some way, it was like when I buy flowers and sometimes go and smell them. And, I did the same with the piece. Sometimes I would remember is there, and I would go and smell it so the engagement with it was definitely more of a sensorial level than, let's say other objects I have. I don't think of doing that with other objects. So, its presence was definitely related to other senses that I don't usually use at all, like smelling something. Something I do very little. Somehow it made me smell things more.

31. R: What was your favorite part of this whole experience?

P 1.2: I think it was very nice to look at it. Although it is something that I have already done with other things. It was quite an interesting object to look at. That is something I did at different times and it would distract me from other things in my life. The fact that it had those shapes, that were more sort of abstract it would made want to try to find something about them try to figure out what they were. You know, it's like when you cloud watch. If you try to find shapes. I engage with it a lot visually, although I was not entirely aware of it each time, I think. But that was something that was nice. Visually, I think it was a very nice thing to have around.

32. R: If you were to think of the overall feeling this gave you or thought, what would you say that was? I am more interested in what your state of mind was upon engagement, or even during this moment when you were engaging with it visually? What was happening in your mind at the time?

P 1.2: I think it is very peaceful. That is why I was talking about harmony before, because that is a bit the feeling that it induces. It creates this peaceful state of mind. It's very subtle, so I think in terms of engagement it didn't invite much of an engagement from my part in the sense of interaction with it, but it was definitely something that takes me to a peaceful state of mind and calming somehow, in its colours and the elements. Visually, it takes me there. I don't know if that was in any way related with the smell. I thought the smell kind of disappeared at some point.

R 1.3 Interview with P 1.3 adopting *Nest Engagement*
Transcript [13 September 2017]

R = researcher

P 1.3 = third participant from the first adoption experiment

1. R: When you talk to your friends or other people about the artefact how would you describe it?

P 1.3: I would probably describe it as a hanging that went on my wall that was really light and delicate and that I would need to interact with at the time that I wanted to. And that it had different essential oils, placed inside the hanging and they were attached by leaves or flowers, and that I needed to pull out certain threads in order to release the oils.

2. R: Where in the home did you place it? Why did you decide to place it there?

P 1.3: I put it in my bedroom. On a blank wall in my bedroom just because I was the one doing it and interacting with it so I thought it should go in my room. If it was in the kitchen or in the living room I did not want it to fall down, so it was just easy for me to put it there. In this way, I could do it in the evening or whenever I wanted to do it.

3. R: Do you think the placing affected the way you engage with it? and if so, in which way?

P 1.3: I think it made me interact with it more in the evening. Just before I went to bed I would interact with it, whereas if it was somewhere else in the house I would do it more in the day. So, I think it changed when I interacted with it not necessary how. Just when.

4. R: Did you use it for something else apart from what the instructions were? Do you think it played any other function in your home life?

P 1.3: I did not use it necessary for anything else, but when I put it on my wall I was like 'Oh, my god! I definitely want something on my wall that looks just like that!' Because it fitted in my room really well. And it is so pretty. So, thinking just in terms of having an art piece on the wall I would have had to have something like this.

R: So, from an aesthetic point of view it really fitted it. It embellished the space.

P3: Yes.

5. R: For how long and how often did you interact with the artefact?

P 1.3: Each time I probably interacted it for about a couple of minutes and it would mostly be in the evening or in the weekday. There were days when I did not interact with it at all. But generally, a couple of minutes. There were periods when I did not interact with it.

R: You said you did not interact with it for a while. What does that while mean, like few days, 2 -3 days?

P 1.3: Yes, a few days.

6. R: How did you find the activity? If you are to simply refer to that, how did you find it?

P 1.3: I enjoyed it. It was good. A couple of times the thread broke so I had to pick at it to get it out. Which was kind of interesting. It was quite nice, pulling it off and seeing the zig-zag kind of come off with it. That was quite fun!

7. R: How did you find the timing of the interactions you had to do, the pulling of the thread? You wish they were longer, they were shorter?

P 1.3: Maybe a little bit longer, maybe having one or two really big pieces, to have a lot to pull off. It was good what it was, actually. I don't think you needed less of anything, but one or two really big pieces would have been cool so that you can keep going for ages.

R: What do you think about the time you had it in your home? Do you think that was enough?

P 1.3: I think if I had it for longer (because, there was still something there that I did not pulled off) I would have interacted with as well. It would have been nice to have it for a bit longer. When I took it down, I felt like it was part of my room now. So, it felt empty. It was weird.

8. R: Did other people interact with it, apart from you?

P 1.3: My sister looked at it and she kind of touched it and felt it, but she did not pull anything off.

R: What was her reaction? I know I am not asking her, I am asking you so it's still your opinion about how she felt, but did she make some comments or something of this kind?

P 1.3: When she got home and I have already put it up. I said com into my bedroom and have a look, so she said 'Oh, wow that's so pretty'. And I explained it to her and she said 'Oh, I see' and she watched me pull one off and then smelling it. She said ' Oh wow, it is really pretty! You need to have something in your room just like that. Because it goes really well in your room.'

R: That as very fortunate, that it fitted so well in your room.

9. R: For how long did you have it in your home before you interacted with it?
P 1.3: I took it home and put it up straight away. And interacted with it straight away.
10. R: After you interacted with it the first time were you more inclined to want to engage with it again? or not?
P 1.3: Yes
R: If you were to describe it how would you say it was the first time you interacted with it? Was it kind of exciting?
P 1.3: It was quite exciting. I did it when I got home so it must have been about half five, and then I went into my room again later on that evening. And I was like 'Oh yes, I forgot I have this, let's do it again' I think it was late, like 10 or something. It was quite exciting.
11. R: When were you most likely to interact with it, in terms of moments of day, times of day?
P 1.3: Generally, in the evening. Just before bed. I don't think I did at all in the morning. Then in the weekend I have done it throughout the day. So, generally when I came home after work, and just as I was going to bed.
R: From what I am getting from what you are saying the time of interaction was ruled by practical reasons, because you were done with work, you were going to your room and so on. Was there something else? Was it planned? Like, I have this thing in my room it will be fun to play with it or it would just depend on when you would go to your room and see it and then think about it?
P 1.3: It was always in the evening but it wasn't like 'Okay, I am definitely going to do it tonight. It was like 'I feel like doing it tonight, so I will'. It wasn't like 'Oh, I don't feel like doing it, but I kind of have to do it'. It was like I wanted to do it.
R: Then, it wasn't task oriented, it was just because you felt like doing it.
P 1.3: Yes. I think it was one time when I did like four because I fancied doing it, pulling off four piece at one time.
12. R: Do you remember what the artefact is about according to the description in the information sheet?
P 1.3: Oh God!
R: I am going to give you a little clue: it was like a narrative. So first, do you remember it, and if you remember it do you think it has any importance?
P 1.3: From what I remember, it was something to do with a bird and collecting stuff for their nest. I did not necessary think of that when I was doing it. To me, it did not have a huge importance. I read it and it was a nice description but I did not think about it when I was interacting with it.
R: Did you remember it throughout? Or you just remembered about it now when I asked you?
P 1.3: I think just now actually. I opened it and read it then and I don't think I read it after that. I have a good memory, I suppose.
R: Do you remember with what purpose the bird is doing that, that is collecting the plants and putting them in the nest. Do you remember that?
P 1.3: I don't know. You mean, why the bird was collecting the plants? Maybe it is just to help the offsprings to identify their nest. I don't know.
13. R: The loose fragments are impregnated with essential oils. What did the oils do for you?
P 1.3: I couldn't actually smell them that much on there. I don't know if they faded or something else. I'm not sure. So, when I put one up I tried to smell it and I don't know I couldn't really smell them that much. So, it didn't do a huge amount for me to smell them. I have oils in my room anyway, so maybe the oils in my room over-powered them. That might be the reason I couldn't smell them.
R: Oh, you have oils in your room already.
P 1.3: Yeas, I have oils. I wasn't burning them while I was doing it. But I don't know maybe they might have interacted with it.
R: The fact that it had the oils do you think it did something for the piece? You said they were very subtle, because you said you had to smell them really close to notice it, but did it do something to the whole artefact?
P 1.3: Yeah. I think so. Initially when you would open them you would smell them and you would notice they are different as well. I think there were lavender and peppermint. These are two smells that I like anyway, so it added to the whole concept of the thing. And it was quite exciting to pull it off thinking 'Oh, I am going to smell this now, I am going to smell this now'. I think it was the anticipation of pulling it off and knowing that you get the smell, that was quite exciting.
14. R: The artefact references the flora of the natural world, how did the artefact fit into your home from that perspective?
P 1.3: Our house is full of flowers. We like to have the outdoors indoors so the fact that it had that earthy, natural feel about it in terms of its appearance as well as the smell it fitted in quite well, in my room. I actually

think in any part of the house it would have fitted quite well. It was nice having that aspect of outdoors, and nature inside.

R: So, did the imagery that was on the artefact made you think of something in particular?

P 1.3: If anything (this it is going to sound odd) it made me think of ferries. It is pretty and delicate and it is quite like ethereal. It reminded me of that. Because of the really delicate material. Because I always think of them playing in the fields and stuff like that. That is the image I got.

15. R: What did you think of the scale of the artefact and was it easy to find a spot for it in your home?

P 1.3: The scale was good, it fitted really well in my room. If it had been any longer I think it would have gotten in the way of what I have. It's not many place where a long piece can go in our house, so that kind of shape fitted quite well. And it meant that I didn't have to necessarily bend down to do anything or reach up. I just put it at eye level and it worked quite well. I had in my head a different place where I was going to put it, but when I got home and I saw it I was like 'oh, that's not big enough'. But it fitted really well where I put it in the end.

16. R: What do you think about the installation? The way you had to put it up?

P 1.3: Really easy. I loved it. Because I am really bad at stuff like that. But because it was so light I could hang it on those two tiny pins. So, all you needed was two really small pins. And it was really easy just to hammer it into the wall.

R: You put it on the wall because that is how I suggested to put it, because I gave you the pins. But if you were to have the pins and to display in a different way, how would you do it?

P 1.3: I liked the fact that it was hung. But if you can get a chain and attach it from that chain that would have been quite nice. If I was to get it hanging that is how I would have hung it, with the chain. Because it was made of that material it need to be hanging. Because if you put it in a frame or anything like then you wouldn't be able to feel the material.

R: What if you, hypothetically speaking, let's say you get this for yourself (you buy it or someone give it to you) and it's a permanent thing how would you display it?

P 1.3: With the chain.

17. R: How did you find the packaging? Did it stimulate in any way the engagement with the artefact? Did it come with any sense of surprise?

P 1.3: When A first gave it to me, it was in the green material and I was like 'what it's going to be inside?'. Because A told me how big it was, so I was like 'this is really long, really light box, so I could not figure out how it worked out, and then when I opened it up it was like opening up a little present. I then realized it was folded. The packaging was good, because it hid what it was. You could not tell what it was from the outside.

R: So, it was mysterious.

P 1.3: Yes, mysterious.

18. R: This is about the level of craft skill that the engagement with the artefact involved. Do you think that was appropriate? What you actually had to do. Did you find that easy enough?

P 1.3: I think so. A told me it is one of the easiest to do in terms of activity, so it was quite easy to do. But I imagined that if I was putting it together would have been difficult to do, in terms of making it. You can tell a lot of detail and effort has gone into it. When you pull it off and you see the zig-zag I am think it takes ages to do that. So, when I was doing it I was not thinking about that. But, now looking back it makes me realize how much work was put into it.

R: But for what you had to do, do you think that was pretty straightforward?

P 1.3: Yes, I think it was straight forward. Apart from the fact the thread snapped and I was trying to pick it up.

R: So, stronger thread!

P 1.3: Yes.

R: This is this method that I found of pulling these threads so that you can release the piece, But, if you were to think of other ways in which you can interact with it, what other things you would like to do to that piece? Apart from pulling the thread, what would like to see?

P 1.3: The only thing I can think of (and I don't know how easy this is to do), but if you had a bubble and you would burst the bubble and the smell released. I did not think about it whilst I was doing it, just now while you were saying it. Yes, just having a bubble and having the oils release that would be quite fun.

19. R: While you are interacting with the piece what did the activity made you think of? When you were releasing the pieces, pulling the threads where were you thinking?

P 1.3: I wasn't thinking that much. I was thinking 'okay, I have a few threads left, few more bits left to pull until I smell something'. That's all that went through my mind. And then a couple of times the threads snapped and it was so frustrating to have to pick it up. It is quite relaxing as well, quite a nice thing to interact with after a busy day. To interact with it and pull the thread it is quite nice.

R: So, if you were to talk about your state of mind, what was your state of mind while interacting with it?

P 1.3: I was chilled. It was good. It was generally the end of the day, so I was tired, so it was quite nice just to do that.

20. R: Did you discover anything upon physically doing the activity? Did interacting with the artefact trigger any sort of realization, thoughts?

P 1.3: I don't think so.

21. R: Do you think your actions have an impact on your home environment, and if so what is the impact? When I mean actions, I mean actions in general but also the action of interacting with the piece. Did that have an impact? Did it change in anyway your home environment?

P 1.3: I don't think it did when I was doing it, but because it was such a delicate piece and you are pulling off the threads. You have to quite careful with it anyways. I don't know if it did impact me but it might have made me a little bit careful and slower, and calmer around the house. I don't know if I was conscious about that, if that make sense.

R: What about your home space? Do you think the fact that you were pulling the threads off and there were oils in there had any impact? I know impact is sort of a strong word but did it reflect in any way on your home environment?

P 1.3: I don't think so. It was nice interacting with it as a piece of furniture or art. I don't know if it affects my home environment in the kitchen or the living room, or anything like that. It's hard to describe what I mean. I enjoyed interacting with that as an item in my house as opposed to using it for cooking or for washing or whatever it might be. It was nice to do it as something just for enjoyment and not that was a necessity; just something to do without apparent outcome or reason, just to make me happy and relaxed.

22. R: Where there any actions that occurred as a result of these interactions? Did it have any effect on the way you behaved at home? Did you start doing some things differently, or start doing things that you did not do before?

P 1.3: Maybe being more careful of my environment. And, a bit more mindful of it I suppose.

R: In which way mindful?

P 1.3: Just mindful of it in the sense that I was paying attention if things needed to be done. I was aware that the object was there and that was something that I could interact with. I became more aware of my surroundings. Of what needed to be done.

R: You just said it made you more aware of your surroundings. Could you explain a bit more how did the fact that you had the piece and you interacted with it made you more aware of your surroundings?

P 1.3: I was aware that was in my room and I needed to go to it to do something. If it wasn't there I just would have been like 'okay I am not interest in that kind of thing' But it just made me more interested in what was going on in the rest of the house, like 'that needs washing, that needs hoovering'.

R: Okay, I understand now. So, yes there were some actions that appeared.

P 1.3: Yes. Not massive, it just made me think a bit more than I would have normally thought.

23. R: How often do you pay attention to the level of dust in your home (and that is mostly in reference to the last two weeks)?

P 1.3: Actually, quite a bit more.

R: Why is that?

P 1.3: I think again for the same reason. I was just more aware of it because I was aware that I was interacting with a piece of furniture or piece of art in my house so I was just thinking 'okay, I am more aware of my surroundings, and my other furniture. So, I started telling my sister 'we need to clean!'

24. R: How often do you open your windows? Again, all these questions are in relation to the last two weeks, the time you had the artefact.

P 1.3: I open my windows a lot anyway, because I like the fresh air in. That did not change that, because I have them opened all the time, because I just like air through the house. Otherwise it just feels stuffy.

25. R: Do you notice any mold in your home, and if so, do you do anything to prevent it?

P 1.3: That's another reason why I open my window, because there is a slight bit of mold around my window, so I try to open it as often as possible to prevent that, and every now and then if it gets really bad, I wipe it down, and put mold spray on it. I do not want that to extend so I try to open the windows as much as possible.

26. R: Do you have any concerns, also referring to the last two weeks, in regard to the fumes that are produced while cooking?

P 1.3: I don't know if that has changed in the last two weeks. We have a door right by our cooker so if it gets really smoky we will open that but again we have always done that. That hasn't changed within the past two weeks. I don't think that our cooking style has changed that much in the last two weeks.

27. R: What do you think when you use paints or solvents in your home?

P 1.3: I am aware of the smell and the fumes that it produces and other things like that. Deodorants and other similar things I do not like using, especially because I usually get a cough after it, so it always makes me think 'Oh, maybe I should get a roll-on deodorant'. But I never do. We just moved in as well, so we were doing a lot of painting so we had to cover our mouths and other things like that. Again, I don't think that has changed within the last two weeks. But probably is something that I should be more aware of now.

28. R: What did you think of the artefact when you read the information sheet? That is, before you received it, when A gave you the information sheet for you to read and to see what this is about.

what did you think of the project and were you surprised when you actually got the piece?

P 1.3: I spoke to A about the piece, in order for me to decide which one would be best for me to have, and she described it quite well. It was exactly how I thought it's going to be. And, the information sheet it was nice because it gave you the backstory of it, why you were doing it. But, I did not think about the backstory that much while I was interacting with it.

29. R: What kind of people do you think might want to own an artefact like this and why?

P 1.3: Yes, I wouldn't mind it. I know my sister would also like it. I know a lot of people that would like it. People that are outdoorsy and like being outside. The kind of people I am picturing in my mind and that would have it on the wall are people who are always outside and who are down to earth, that go for walks and camp. They are the kind of people I would picture, having the one I had anyway. And, who have the time to do it. Maybe people who aren't really busy and constantly away from home or something. People who could have it in their house and appreciate it.

R: Okay, you said people that like to be outdoors and also people that have a little more free time on their hands, so that they get a chance to enjoy it.

P 1.3: But on the other hand, it could be quite nice for people who are busy to have it as well, because it will give them a change to interact with their home and be aware of their surroundings. And just give them a bit of time out, even if it is just to spend a few minutes with it here and there. They could use it as well.

30. R: If you were to give the artefact to someone, what would you tell that person?

P 1.3: I would tell them something similar to what I was told to do which is to interact with it in the way you want to interact with it. There aren't any rules that come with it. Just interact with it whenever you feel like. I am not saying there is no time limit or time pressure, but that you can do it whenever you want to do it and put it wherever you want to. And just enjoy it. This is probably what I would say.

R: Would you describe it in any way?

P 1.3: Yes, I would but I wouldn't necessarily go into depth. I would say 'I have this hanging here for you. You can put it out wherever you want to, there's a few things you can interact with on there just by pulling a few threads, and just use it as you please'. I don't think I would give much detail. Instead, I would let them explore it, as they want to.

R: Would you tell anything about the purpose of it?

P 1.3: Not initially. But after they've interacted with it I will ask 'How did you find it?' and I'll explain the purpose of it. But I wouldn't do it before hand.

R: If you were to explain the purpose of it after that what would you say?

P 1.3: I would say that is designed to help you interact more with your home environment, and see if it would change the way perhaps you interact with your home environment as well as bringing in an outdoors space into your own home, in a very non-invasive way. That to perhaps subtly change your habits.

31. R: What was your favorite part of this whole experience?

P 1.3: My favorite part was opening it up and putting it up on my wall and interact with it at the beginning when it was all new and exciting.

32. R: If you were to think of the overall feeling this gave you or a thought, what would you say that was? I am more interested in what your state of mind while you engage with it or right after? What feelings, what sensations, what thoughts?

P 1.3: I never saw it as a chore. It was just a fun thing to do, so I thought of it in that sense. After doing it I just thought 'that is done now, it was quite good, I feel happy now. I can go to bed quite happy'. Whereas if I hadn't done anything I think I would have had the same kind of boring evening. It is really hard to put this into words sometimes.

R: I know because I am asking you of a feeling and a state of mind so it is kind of hard to describe it. It's not rational, it's emotional.

P 1.3: It gave me a general positive mood, in terms of my feelings.

R 2 Interview transcripts from the second adoption experiment

R 2.1 Interview with P 2.1 adopting Artefact 2.1

Transcript [2 February 2018]

R = research student

P 2.1 = first participant from the second adoption experiment

1. R: If you were to talk to your friends about the artefact how would you describe it?

P 2.1: I guess formally is a wall-based artwork that is interactive and actually requires some regular interaction. Additive interaction to build on it, to add to it.

2. R: Where in the home did you place the artefact, and why did you decide to place it there?

P 2.1: I ended up putting it in my living room, on the bigger wall, because it was bigger than the other place I have mentioned to you before, and also because that is the room that we live in the most. So, I thought with the pepper mint it might be really nice to infuse that room with it and also, spend time with the artwork.

3. R: Do you think the placing of the artefact affected the way you engage with it? If so, how did it affect it?

P 2.1: Definitely I am happy that I put it in the living room because I could actually look at it, as an actual artwork not just work to be done that is visited ever so often. So, I was happy that I chose to put it in the living room after all. I could only choose that once I saw the work, because I did not know what to anticipate exactly. So, having it in the living room allowed me not to just actively interact with it but also passively, which I found really enjoyable.

4. R: What did you use the artefact for? Did it play any function in your home life?

P 2.1: It was artwork in the house, which was a nice pleasure.

5. R: How often did you engage with the artefact, and for how long?

P 2.1: It was for exactly two weeks and almost every other day. But maybe it must not have been exactly every other day because there is one more envelope with some leaves in it. Only one envelope left over. And it was around 15 min to half an hour each time.

6. R: For how long did you have it in the home before you interacted with the artefact?

P 2.1: Two days. It took me a little bit to get warmed up to it. And to want to put it up. I think the first day (when I got home) I left it wrapped up. Then the next day I unwrapped it to look at it and explore all the beautiful packages and then I thought where I want to put it so I gave it another day.

7. R: What happened after you interacted with the artefact the first time? Were you more inclined to want to engage with it again, or not? Why, or why not?

P 2.1: The first time I interacted with it there is the novelty element so it's like opening up nice mail, or something similar. So, I think the packaging really helps. It seemed very precious. It looked precious to you, so I knew to treat it in the same way. And, that first time was interesting. It was very layered. Because it stimulated so many senses: tactile, visual, and also, olfactory, like aromatherapy. So, there is something really therapeutic but also thoughtful about it. I spend some time with it because of the aroma. I could spend all day with peppermint smell and then there is also the tactility of the paper, and the fabric textile. So, yes it was very pleasant and it was really soothing.

8. R: When were you most likely to interact with the artefact? Why do you think is that?

P 2.1: There was no routine to the way I interacted with it. The only thing was that I did not want too much time to pass before I opened the next envelope to put more leaves because I knew I only had two weeks. So actually, the time frame was the thing that prompted me to interact with it. Because when I opened it I saw that there are six envelopes and that I have two weeks, so I calculated how much time should I be spending on average.

I said I left it alone for two days, so if you did not give me a two-week timeline I might have taken much longer and might not have been so diligent. I felt like I must be diligent in order to see what this is about. I think that the fact that the artefact was in the living room and the fact that we were there everyday helped, because I was reminded when I saw it that if I did not add more leaves to it so then I should, and I should write something. So, it was really mainly intuitive in general, apart from thinking about the two-week timeframe and how much time I should be spending with it.

R: So, you wouldn't say that it happened mostly in the evening or some other particular time of day?

P 2.1: No, actually you will find that I wrote down the times and sometimes it was in the evening and sometimes was during the day, sometimes in the morning even.

9. R: Did other people interact with the artefact? In what circumstances?

P 2.1: No. I live with J and I asked him if it's okay if I bring this research project home and he said 'that seems fine'. He asked 'what do we have to do with it' and I explained it to him. He saw me working with it and making my notes, and he was curious and asked me about it and asked 'do I need to do anything?' and I said 'you can, but you also don't have to'. He asked 'should I write anything about it?' and I answered 'well, if you are not doing anything with it then I don't see why you need to write anything'. So, in fact he did not touch it at all and he did not write anything at all. But he spent time with it in that more passive way, as an artwork in our home.

R: Did he mention anything about it?

P 2.1: No, he said he liked it, he thought it was beautiful as well. He's less sensitive to smell so I think the essential oils didn't impact his experience of it that much because I wear it sometimes as well. He noticed it visually mainly. He did not touch it and he noticed the scent because I left him smell it as well.

I have been sick during that time, so my sense of smell was really diminished. So, I could smell it when it was in front of me, but I could not smell it in the air, which I imagined might have had some scent.

10. R: Did you remember what the artefact is about, according to the description in the information sheet? Do you think that knowing about the narrative behind the artefact has any importance?

P 2.1: I remember it's about a bird, it has an interesting name, I forget the name of the bird.

R: The blue tit.

P 2.1: Yes, interesting name 'the blue tit' bird, and it helped me understand why you chose the interaction you chose, the prompt. And I found it interesting, I always found that trivia stuff, the extra information interesting. But, if you had simply said 'put the leaves in when you want to or when you feel like it' I would still be able to accomplish it, I would have understood, but I like knowing that. But, I don't think it depends on me knowing that information.

R: So, if we are to talk about the importance?

P 2.1: It's not crucial to me engaging with it, but it helps me understand why you are asking me to engage with it in that way.

11. R: The loose fragments are impregnated with essential oils. What did that do for you? Did you like that? Why, or why not?

P 2.1: It was like a little gift every time I opened it. I got to be invigorated by the peppermint scent and I find that really comforting. I thought it was great, it was the thing I was looking forward to: opening it up and seeing each unique leaf and smelling it.

12. R: The artefact references the flora of the natural world. What did this particular imagery make you think of?

P 2.1: It reminded me of a small green screened garden or mini garden or mini green-house effect, because of the translucency, the textiles looking through it and the many layers of it. The small mint leaves reminded me of the monstera plant. It's a common house plant that is very prized, because it can grow really big. It has almost a tropical feel to it, just because of the way they were designed with the bold colours. It almost reminded me of beautiful printed scarves.

13. R: What do you think of the scale of the artefact? Was it easy to find a spot for the work in your home?

P 2.1: It was reasonable. I liked the scale of it. It gave me something really nice to look at, but in terms of being easy to find a spot in the home, it had some restrictions. Like I said, I had a couple of other spots in mind where I thought it should go but ultimately the scale determined that it wasn't appropriate for those spaces so I had to re-envision where to put it. But, it wasn't hard to find a new spot for it.

14. R: What do you think about the installation? Do you have any suggestions on how would you like this displayed?

P 2.1: I know you gave us pins, but instead of using pins I just took one artwork off the wall and then I put a string and I hung it like a weaving or like a wall-hanging and I thought that was nice too. So, I thought the pins are a nice touch, but then you have to make sure it is leveled, which makes it trickier. I think with the two pins it would look really nice and clean, but for the two-week period I did not want to spend time to level everything, so that's the only reason I did not use the pins.

15. R: How did you find the packaging? Did it play any role in your engagement with the artefact?

P 2.1: I described a little bit earlier how thoughtful the packaging was, and it felt like someone wrapped a gift in many layers of beautiful paper too. That was very inviting, so I wanted to do it justice and give it time as well.

I think in terms of the packaging of the leaves, having them enveloped was really nice, but then I wondered how can you re-use them again. Because I thought 'if this is a long-term project, what happens if I run out of leaves? do I have to replenish my stock of leaves?'. Overall, if I was to purchase this artwork, I would have

been really happy to open up all the packaging and to unfold it. It unfolded the project right in front of me, so I thought that was really nice. And I liked the little notebook. Everything seemed really thoughtful which prompted me to be more thoughtful about it. So, I think that is what the packaging did, as opposed to you putting it in a cardboard and saying 'here!'.

16. R: How did you find the activity? Why is that?

P 2.1: I thought it was easy. As long as I remembered to do it, to place it was fairly easy. The only trouble was to initially find the slots on the back (it is really hard to see depending on the time of day) and then it was hard to put the fragments in. These are the two criticism: it was hard to see but then I got used to it, and then the slots. I had to fuss with them to get the leaves in, because I had to flip the work around so that I could easily get it in and then flip it back. This was really quick, so even though am saying I had to fuss with it, it would have been seconds, maybe minutes once I get used to it. And then in terms of writing, just spending time with it I was surprised: I knew it could be done in a matter of minutes, but then I was like 'no, I will think about it a bit more'. So, I would say I exaggerated the amount of time that maybe you may anticipate someone to spend with it. It was not the bare minimum of time that I was spending with it, I made the point to draw it out a little bit and think about it a bit.

R: The time you spend with it consisted of opening up the packages, looking at the leaves, deciding where you want them to be placed?

P 2.1: Yes, looking at the front then looking at the back and then trying to fit it in a nice way. I was not doing things like putting it in and then checking and then placing it again. It was more like wherever I put it, it was where it was going to live by the time I turned it back to the front face. But really, it was like opening the leaf package allowed myself to be mindful and smell and just be present with it.

R: What do you mean by present? Could you describe that in a different way?

P 2.1: To be with the work, instead of just treating it like a task-oriented from A to B. It was more about what happens between A and B, so I wanted to really experience it, as opposed to just follow the instructions, that is put the leaves in to the slots and have that be done. I actually wanted to have a sensory experience of the whole thing: touch the piece, smell the oils, look at the many layers of the artwork.

17. R: How did you find the timing of the activity? Did you wish the activity was longer? shorter?

P 2.1: It could be as short as you want it to be, so I think if I was in a rush I would have appreciated that. If I was 'I need to get that done today', then I can do it as fast as I wanted to. But then if I had more time, I could draw it out more and really experience it.

R: Can you elaborate on the experience part?

P 2.1: I think towards the end, my last note was about how the experiencing of the work changed for me slightly, in the sense that it become less of a novelty and more like a dedication of time. And maybe this is where the story about the blue tit bird makes sense in my mind, because I realized that 'what we are mimicking is this natural gesture (action) that an animal takes and that is what we are trying to do, or that is what we are mimicking in this research participation', so it started to feel more like work and I thought 'I need to do this, I need to make sure I do this and add to the artefact. In terms of experiencing it and being present with it was like dedicating my time to it.

R: You mentioned it was not task oriented, but the focus was on experiencing it.

P 2.1: It was, and then it wasn't and then it became that again. And, that is just me moving between how I am feeling towards it. It is a labor too if you think about it. It is a task that needs to be done, but it is about how much more I give to that. How much more time, how much more attention. I could just open the leaves and then stick them in and then it's done but when I say I want to experience it beyond the simple task of 'taking the leaf and put it in' then that was me pausing with the work to see what else about it would speak to me and stimulate my mind, stimulate my body, stimulate my senses. Giving it more than you ask for it, because I was assuming that your instructions are a prompt, but it's also art. It looks like art, so I don't know how could I be able to look at it and not see it as an artwork. So, when I spend time with it as an artwork it was a different type of labor than to place something in. It's not as straightforward as that. And, by labor I don't mean is really hard work but it's asking something of me and it's more abstract than simply do step 1, 2, and 3. Because for that could be anything, right? So, I think it was really multi-faced in that way. I could see the potential for me to experience it beyond what you had asked of me as a participant.

18. R: The engagement with the artefact involves a certain level of skill. Did you think the level was appropriate? Do you think it should require more/less involvement? Could you think of any similar actions you would like to see translated in a textile artefact?

P 2.1: It was obviously something that I could not make with my skill level, but for me to respond to your prompt I did not feel like I needed any special expertise or knowledge, aside from being able to see where the slots where. It really helped that when you handed it in to me that day you said that there will be slots,

because that was not obvious until when I looked at it to put the first leaves and I was like 'where does it go?'. Then, I noticed there are two leaves and I remembered you saying to put it in the slots, so I knew where they should go, and what I am looking for. That was a little bit tricky so maybe a little more information that people can rely on (in a similar way to the written instructions), because if you are not telling people then they might not know. I did not think I needed any special skills to interact with it, but I needed to be gentle, and I had to be respectful to it, because it seemed to me that it could be damaged if I wasn't careful with it.

19. R: What did the interaction with the artefact make you think of?

P 2.1: Well, it did make me think of the story you already told us, of the blue tit bird. Because as I was doing it I was thinking that is interesting that the bird would bring these and they had these antiseptic...

R: Health-beneficial properties.

P 2.1: Yes. So, I had that in my mind even though we are obviously not nurturing birds, but it felt like I was doing the same thing for our home environment. Without you telling me that, I don't know. I don't know if my mind would have wondered to something else. I am honestly not sure, because every time I interacted with it I had that story in mind.

20. R: Did interacting with this artefact triggers some sort of discovery? Some sort of realization? Did you discover something while you were interacting with the artefact?

P 2.1: One thing that I noticed was that I was automatically adding leaves. I was not removing any of the old ones, I just kept adding and maybe because there were no instructions to remove leaves. At some point when I was down to the fifth envelope I thought 'I might run out of leaves sometime but I haven't yet so I am not too worried'. Then I thought I would also run out of space at some point by just constantly adding, so it made me realize that: (1) I was approaching from one direction of interacting with the artwork, and then (2) that it felt more like work the more times I did it. So, the fifth envelope it felt more like a task than that first envelope. So, those two things came up in my experience of it. Now that you ask that, I remember thinking that the thing that is alive is me and J, the plant life in the artwork is not alive so there was this moment when I thought 'is this action enough to keep on going with it? if this was a permanent artwork in my home, that I purchased from you and the point is to keep adding to it, am I going to want to do this during the time I am owning this? What, will be my enthusiasm for this?'. I realized that maybe all it needs to be is that it will define our space at home, make it more comfortable with the aromatherapy, and more visually comforting with the artwork. So, maybe that is all that it needs to be. But it did make me wonder in terms of my participation with it. It's different than nurturing a plant that is actually alive and will respond to light and food and nutrients. So, I think that by the time of the fifth envelope this was the thing that I was thinking 'this textile and paper object is not alive, so would I be as keen six months or one year down the road to keep building on it, or at a certain point would I be happy with it as a non-participatory artwork?'

R: If we were to think of how it transforms, or how it evolves, what would happen with your interest towards the piece? Let's say in a month or two. If it would have some regenerative mode, then would your attitude towards it regenerate, or it would continue to be the way you were saying?

P 2.1: Yes, because ultimately the artefact does not need me in the way that a living plant would need me to care for it. And, the blue tit bird it's doing this for its baby birds in its nest, so there is that motivation, but then when I think about an artwork that can by nature live by itself on the wall, then I am thinking what is the thing that will keep me wanting to get back to it many years from now even. When I think about it now, if you had a huge wall, like a mural, that could be something so broad that I as a participant could change that year after year. So, scale would be something to work with.

R: By interacting with the piece you made the difference between something in your home that is alive and something that is not. How did you get to that realization?

P 2.1: At first, I am so alert by the novelty of it and the discovery, all the new discovery of smell, sight and touch, that I am not thinking that far ahead. But, the more routine it becomes (I think routine and repetition leads to the idea that this is a form of labor) I realize what it is, and I start wondering about it. And the long-term goal of the artefact.

21. R: Do you think that these actions have an impact on your home environment and the way you view your home environment and if so, what is this impact?

P 2.1: It really reminded me that I have a few plants at home, and that they exist just simply because of the action that I was taking with the artefact to care for it, and I was relating it to the other living things in the home so, that was interesting. I did not realize that might happen, but as I was handling the leaves, I was thinking, oh, I guess I should water that plant now because that needs some attention as well. And, in terms of it functioning as artwork in our home, that was really nice as well because it helped me and J as well on some level to have something different visually that would stimulate my mind in a very different way. I never had an artwork like that, I just never seen an artwork like that before. In terms of a wall-hanging: I have a weaving at

home and a framed photo, and drawings but nothing like this. It looked really tactile. It wasn't like I was constantly touching it but when I looked at it all the textures were so interesting.

R: You were talking about the plants, but what about other things in your environment?

P 2.1: The plants symbolically because they were alive, but also because visually they look alike: leaves and plant life. Other things in the house other than humans. I don't think so. It did not really change our behaviour in the living room, we still used it the same way we normally would, with or without the artefact on the wall.

22. R: Where there any thoughts/actions that occurred as a result of these interactions with the artefact? Did you start doing something else as a result of that interaction? Did you start doing some things differently, or start doing things that you did not do before?

P 2.1: I stopped to be thoughtful in order to take notes, that was new. Because I realized I had to write something and writing is something that is not my normal practice. I do not journal, and so that was different. But I think that is more in line with the research part of it.

R: What did the writing do for you?

P 2.1: It made me spend more time with it and also reflect on it, on what I was doing. And in that way, I found it helpful. It clarifies or makes some part of it more confusing, and in this way, have more things to think about. It demanded some thoughtfulness for sure.

23. R: How much attention did you pay to the level of dust in your home in the last two weeks?

P 2.1: Not a lot. Funny enough I usually vacuum once or twice a week, but I did not vacuum at all this week. I did not even relate it to the artefact, but maybe it has to do with it (?) I don't know. It was also a busy week, so I don't know if it had to do with the artefact.

24. R: How much attention did you pay to the fumes produced while cooking [/smoking] in the last two weeks?

P 2.1: We are pretty mindful about it because I am just aware of smells from cooking in general and of humidity, so we usually close the kitchen door and have a fan on as well. So, it wasn't necessary about protecting the artwork because it was far away enough from all of that residue that could generate and build. So, I could say that generally 8 out of 10 I care about that stuff and it was the same over the last two weeks.

25. R: What did you think of when you used cleaning products in your home in the last two weeks?

P 2.1: We only used vinegar and baking soda, and in extreme cases bleach. So, I did not have to think too much about cleaning products in relation to the artefact.

26. R: What did you think of the artefact when you read the Adoption Form?

P 2.1: I thought I had to be responsible for the thing. You had the little picture of the work but the scale was so small, so I thought that was really deceptive, because there is no size there. I am sure you saw that I was surprised when you brought it. The adoption form I think it was similar to the packaging. It reflected that we are being screened. You demonstrated in the packaging of the artefact that is precious, so it heightened my awareness about the value of the artefact, and then to call it the artefact as well. All these things heightened its importance and its value.

27. R: What kind of people do you think might want to own an artefact like this and why?

P 2.1: Maybe people who like to care for things like plants, and those who are interested in using different types of diffusers for aromatherapy. I specifically don't like the bamboo diffusers, for some reason. But your artefact when you said that it had infused elements to it I thought it would be really interesting. And, maybe people who like to collect 2D work for sure, because there is something really beautiful to look at even without all the other portions of it. It could have hung it in a window so that it could have light go through it. But in fact, I did not even hold it up to the window, I do not know what the diffusion would be like on the paper. Anyone who likes to collect art and people who are more conservative and like watercolour paintings of flowers. But this would be a different level of that.

28. R: If you were to give the artefact to someone what would you tell that person about the artefact?

P 2.1: I would let them know as much information as the artist provided to me. The story about the blue tit bird, I think it gives it a direction, a reason for why this action. I would tell them who made it, who the artist was, and about the essential oils because I think that is important for people who are interested in those things. I would also tell them exactly what to do with it. I think it all comes down to the fact that the instructions are very important to me. So, if I was to hand this over I will still give them all of the information you gave me. I would not reduce the information you have me, I would tell them as much as I know. I don't think that people need to know every single thing but it's nice. I think as much information as possible it's always nice.

29. R: What was your favorite part of this experience?

P 2.1: Just having it our house. When I hung it, I thought 'oh, this would look really nice in our home for a long time'. I think just having a new work of art (I considered it a work of art as opposed to a research project) in our home it was a real privilege. I got to host this for two weeks and look at it and spend time with it, so that was the part that felt really good. Every night we were in the living room, so it was really about spending time with it.

R 2.2 Interview with P 2.2 adopting Artefact 2.2
Transcript [4 February 2018]

R = research student

P 2.2 = second participant from the second adoption experiment

1. R: If you were to talk to your friends about the artefact how would you describe it?

P 2.2: It is nice to look at. It felt like a calming thing in my space, with the colours that you used and the choice of materials. There was something very nice about the ritual of opening this special little packet and then popping it into the pocket.

2. R: Where in the home did you place the artefact and, why did you decide to place it there?

P 2.2: I placed it in my living room, because it is the room in my house where I spend probably the most time when I am not sleeping and I have wall space in my living room. It is like a hub of the house. When I walk in the front door the living room is the room that you walk into. So, I felt that it would be the space where I would probably interact with the artefact the most.

3. R: Do you think the placing of the artefact affected the way you engage with it? If so, how did it affect it?

P 2.2: Yes. I would see it multiple times a day. The living room is the place where I come home from work, I often eat dinner in the space, I relax in that space, I do work in that space, so even if I wasn't directly touching the artefact or doing work with the paper pieces, I would be able to glance over to the artefact. I would be involved with it in a less deliberate way.

4. R: What did you use the artefact for? Did it play any function/role in your home life?

P 2.2: Apart from putting the scented pieces into it, I didn't interact with it in a big way. If someone came into my house that hasn't seen it before I would talk about the artefact. People wouldn't have guessed that it needed to be interacted with it. They would just think it is something decorative on the wall. Most of my interaction with it would have been physically activating it, that is putting the paper pieces in.

5. R: How often did you engage with the artefact?

P 2.2: I would be in the room with the artefact every single day, some days for an hour, other days I was sick so I was literally all day there for about 12 hours. I couldn't smell anything at the time but I was there. Also, the artefact was one of the first things I would briefly see when I would wake up because I would get into that room and open the curtains. And also, every time I entered my house the first thing I would see was the artefact.

R: And, for how long every time?

P 2.2: Per day on average at least three hours I would be in that room.

6. R: For how long did you have it in the home before you interacted with the artefact?

P 2.2: You gave it to me on a Friday and I didn't actually open it until Sunday, so it was sitting for a couple of days, but once I unwrapped it then there was a big interaction right away in terms of putting it on the wall and putting something into the pocket.

7. R: What happened after you interacted with the artefact for the first time?

P 2.2: I was very taken with the amount of fragrance coming out of the package, so I was a little bit concerned thinking that it may be really strong and too much in my house. After I put it on the wall and put the piece into the pocket I decided to keep the remaining pieces (the rest of the package) in my linen closet. Because I thought it might be really nice to have that fragrance going in that area.

R: Where you more inclined to want to interact with it again, or not? Why, or why not?

P 2.2: I was excited about the project. Not knowing what your thesis is in total, I was very curious about how this would make me feel and what benefit or detriment would have by being in my house. So, after the initial interaction I felt that I was much more aware of it than I was about other pieces of artwork that I had control over. I chose to put there for a certain reason, so, I felt like I was waiting for something to happen. I was not sure how it would make me feel. It was certainly very nice to have in my home but I got very used to the scent so it was something that I stopped being aware of. I am not sure if this is because my body got used to it or because the smell kept on diffusing throughout the couple of weeks. Maybe a mix of both.

8. R: When were you most likely to interact with the artefact? Why do you think is that?

P 2.2: Definitely in the evening, because I am home. We are eating dinner in the living room and I am looking at the artefact. Then I think that I have more of these paper bits to put in, so I make a point to go in and make that interaction.

9. R: Did other people interact with the artefact? In what circumstances?

P 2.2: Not in the same way that I did. I was the only person putting the pieces in. I certainly had other people in my home who saw the artefact, and we chatted about it. But I was the one having those bigger interactions. I think before I explained about the pieces of paper with fragrance, people thought it is decorative.

10. R: Did you remember what the artefact is about, according to the description in the information sheet?

P 2.2: I definitely thought about the bird and liked that idea lot. I have three animals that live in my home, so I am always thinking 'does my house smell like animals?'. I am always concerned about that, so I liked thinking that maybe this was helping with whatever imagined smell.

R: Do you think that knowing about the narrative behind the artefact has any importance?

P 2.2: Yes. The artefact itself feels close to nature because of the imagery that you used and the lightness of the textile, so I think linking it to the blue tit straightened that connection with nature further in my mind, which made me feel that whatever I was doing with this artefact was very natural, healthy, good for me which could be used in a marketing way to make you believe more in the artefact, whether or not that is true. It could be some synthetic fragrance. But I liked that story, even though it was just that very small fact. I certainly thought about the bird throughout the couple of weeks.

11. R: The loose fragments are impregnated with essential oils. What did that do for you? Did you like that? Why, or why not?

P 2.2: I did like it. When I first opened the package, I thought it is too strong, a lot of essential oil, but as the two weeks progressed when I would open each little parcel I could definitely still smell the fragrance but it was much less strong. I liked the idea of thinking that maybe it was some kind of purification in my nest, if I was the blue tit. But in terms of making the environment of my house feel different I don't know how much it actually did that, just because of the potency.

12. R: The artefact references the flora of the natural world. What did this particular imagery make you think of?

P 2.2: It made me think a little bit of a 1960s or 1970s print. There was something about the browns that you used. Maybe it was something about the Queen Anne's lace, that type of flower, so it was making me feel a bit nostalgic for a time I did not live though, but some kind of textile print that I could image from that era. It made me think of a warmer time of year as well.

R: Do you think it did something for your home?

P 2.2: I think it probably made me engage with the space in my home more. There is something nice about having intentional acts that you need to do. That was nice, thinking that I am going to enjoy the way this thing looks and then I am going to go and interact with it and then I am going to feel calm. So, there was something nice about the rhythm of that. I think it looked nice with my décor. It was certainly something nice to have in the home.

13. R: What do you think of the scale of the artefact? Was it easy to find a spot for the work in your home?

P 2.2: For me it was easy, because I have big expanses of wall. Had it been bigger, I certainly had room but I would imagine would have been more challenging for someone else to find a space.

14. R: What do you think about the installation? Do you have any suggestions on how would you like this displayed?

P 2.2: It was very easy to display. I thought it was weighted well so it hung very nice and straight, very minimal.

15. R: How did you find the packaging? Did it play any role in your engagement with your artefact?

P 2.2: Yes, it did play a role. It made me feel as if I was part of something special. It made it feel special seeing that you have scored this piece of paper and made this box, so I could imagine you having to take initially a lot of time to create this packaging which made me have a different kind of reverence for the packaging and what was inside of it. I felt like you had taken time so I need to care about it as well, so certainly. And everything coming in its own little envelope was very nice too. Everything felt intentional. And I did enjoy pulling apart your sewing machine stitched threads. Almost always I could just pull one and they would unravel. Sometimes they were a little bit too tight, or I pulled the wrong thread so I had to insist, but often they would come off very easily.

16. R: How did you find the activity? That means unraveling the pieces and putting them in their pockets?

P 2.2: I enjoyed that that act took a little bit of time in the sense that: you chose the one that you wanted (out of the two envelopes) and then you start pulling that thread to unwrap it. It was nice then to match it to the pocket that you felt was the closest in size and shape, and then sometimes having to shimmy it into the pocket, because most often you couldn't just drop it, you had to pop them in side to side. I liked that it was simple but it took a couple of minutes from start to finish. There is something nice about the time you take,

you are being made to engage with it for that time period. It is not just spritzing something in the air, or quickly dropping a piece in.

17. R: How did you find the timing of the activity? Did you wish the activity was longer? shorter?

P 2.2: I think the timing was absolutely fine. I think that if it was a great deal longer then it wouldn't be something that I would just think 'oh, I will just go and do that right now'. I think the idea of the blue tit could be wrapped even deeper into the project. Maybe you unwrap something and there is another little fact. I could only imagine it being effective to make it a longer process, if you were building an extra level of engagement not necessarily difficulty.

18. R: The engagement with the artefact involves a certain level of skill. Did you think the level was appropriate? Do you think it should require more/less involvement?

P 2.2: It felt like a good amount. I could imagine it being reasonably accessible for a large group of people to do. It felt completely reasonable to me.

R: Was there sometime that prompted you to go and interact with the artefact? What was that sequence? How did things happen?

P 2.2: Often I would be sitting in the living room (which is where I often end up at the end of the day) and it would be the time of the day when I could finally relax. So, I would probably finish the activity that I was doing initially in the room (like eating dinner for instance) and notice the artefact, remember that maybe I should put something in it because I am counting down when it has to go back to you (I am trying to meter out the pieces so that I don't use them all in the beginning and not have to rush to put them all in at the end). So, it would be about being in the room, seeing the artefact, feeling like I haven't done this in a couple of days and then after finishing eating or something, going and getting that little piece and putting it in. And then often I would be spending more time in the room after I had that interaction with the piece.

19. R: What did the interaction with the artefact make you think of?

P 2.2: I recently started taking yoga classes and there is something about this idea in yoga where you try to be in a space and not actually think about anything. So, there is something about the idea of this repetitive thing (like, I have to go every week, it makes me feel good, it is very relaxing). Sometimes is hard to decide that I am going to take an hour and try to slow down, and not be productive. I felt in a similar way about the artefact. In the sense that I wasn't being productive, I wasn't doing work in the evening, but it was nice to feel that I have to slow down, stop carrying about everything else that is going around in my head and just do this one little thing that will make my home feel better.

20. R: Did interacting with this artefact triggers some sort of discovery? Some sort of realization? Did you discover something while/after you were interacting with the artefact?

P 2.2: I can't think of it triggering some kind of realization. I certainly would think about it in the deliberate way that I was just talking about, having that sort of schedule and having to attend to it.

I would think about it as a product, and how could this be changed a little bit to market it. Because not knowing what your intention was I was thinking 'what if it was a bit more like this, or like that?', 'how it would appeal to different people?'. So, I thought about it in that way, as a commodity.

21. R: Do you think that these actions/interactions with the artefact have an impact on your home environment and the way you view your home environment and if so, what is this impact?

P 2.2: It was nice to feel I had this intention with the artefact, I was taking care of it, I was putting its little paper pieces in, and the rest of my living room could be like a mess. This little artefact seemed really pristine and taken care of. It was the sense of order, when I could have other things all over my house. I would think 'oh, I should tidy up but the artefact looks good'. It felt nice to have something that I felt I enjoyed the appearance of, I don't think that the fragrance affected me very much, as time went on. I was wondering how I would feel differently if the fragrance was stronger, if it would be too strong or if I would walk by and get a whiff of it (that would be a nice thing), but that didn't really happen and I feel that I got used to it.

R: So, in relation to these actions and their connection to your home, did interacting with the artefact had an effect on the home environment, or the way you perceive your home environment, or the way you behave at home?

P 2.2: I think it made it feel calmer, because of the way it looked and that intentional interaction that I had to have.

R: You were talking earlier about the artefact and the rest of your home, and you made the distinction between those two. Did you having to interact with the artefact triggered that thought?

P 2.2: No, I often feel like my house is a mess, and by contrast I thought 'this artefact isn't a mess'. It was nice to feel there was this sense of order. And a lot of these feelings of 'oh my house is a mess are not even necessarily a true reflection of the environment, they come from some kind of internal thought 'is this enough?' or, 'am I happy in this space?'.

22. R: Where there any thoughts/actions that occurred as a result of these interactions with the artefact? Did you start doing something else as a result of that interaction? Did you start doing some things differently?

P 2.2: Probably not in a big way. There were no big changes made. I think I certainly felt that (and that went along with the packaging and the little story) I had this special thing in my house so maybe I also felt like the rest of the room should reflect how special that thing felt. Which made me think 'I need to clean my house'. I always like spending time in that room but it made me feel like it was important for me to spend time in that room, because I needed to be around the artefact. So, I wouldn't say I spend more time in that room, but I was a bit more aware of how much time I spend in that room.

R: And what about the space?

P 2.2: I don't think that it changed the way I did anything in the space necessarily, but it felt like a nice presence in the space.

23. R: How much attention do you pay to the level of dust in your home in the last two weeks?

P 2.2: Probably not the much. Just before the artefact arrived I was having work friends over, so I felt that I really needed to make my house very clean, which is good, because when people come over I think 'now I am going to make it really clean'. So, there would have been very little dust when the artefact came in. So, it wasn't on my radar. Had the artefact arrived at a different time, then maybe I would have thought 'oh, it's really dusty'. But I don't think it was something I was thinking about.

24. R: How much attention do you pay to the fumes produced while cooking [/smoking] in the last two weeks?

P 2.2: In the room where the artefact was kept there is a fireplace so sometimes the smoke will come into the room a little bit, so I certainly noticed that. But it isn't so much a negative thing, it's more comforting, wood smoke smell. Cooking, absolutely. I was doing a lot of frying which can make a less pleasant cooking smell. So, I could say that I certainly thought about those things.

25. R: What do you think of when you used cleaning products in your home in the last two weeks?

P 2.2: Generally, with cleaning products I often don't like the smells of certain conventional cleaning products, because they burn my throat in a weird way. So, I would often try to clean with other things than those, like dish soap instead. And I certainly thought about incorporating essential oils into cleaning more. I haven't actually done it very much, but I read about it a little bit, so I think that I would rather put that kind of fragrance into the air in the home rather than something that is more chemical.

26. R: What did you think of the artefact when you read the Adoption Form?

P 2.2: I was very unsure about what it was. There was a little photo, but it did not give me enough information to really understand what it was. I thought it would be smaller than it was (maybe that didn't have to do with the form). I was picturing putting it into this little slice of wall in my bedroom and then it arrived and it was bigger so that made me change where I wanted to put it. I really had no idea, it was just a mystery. Reading the disclaimer about there being essential oils used, I was thinking of fragrance. But I did not know what this thing would look like at all. I think the word artefact made me think about something old, sometimes, right? So, I thought it was very simple and clean. I thought it would be more textured or heavier in its appearance and it was very light and quiet. And I think that is just because of the association that I have with the word artefact.

27. R: What kind of people do you think might want to own an artefact like this and why?

P 2.2: People who are into natural health and wellness, potentially yoga because there is something about the relax scheduling, the intention of taking care of it and wanting some kind of fragrance in your home, but one that is very quiet, healthier and natural than some other things on the market.

28. R: If you were to give the artefact to someone what would you tell that person about the artefact?

P 2.2: I would describe it as a wall hung textile. I would definitely want to tell them about the little bird and how the little bird purifies its nest, because that whole idea is so wonderful. And then they would feel like the little bird putting these little bits in their nest as well. I would talk about it being calming and attractive, and I would definitely want to talk about the ritual because that is something that I really enjoyed, the ritual of unwrapping those little pieces.

R: What do you mean by ritual?

P 2.2: That act of slowing down and slowly opening each of these little paper pouches and deciding to put it somewhere and doing that every few days, that felt quite ritualistic to me.

R: What did that ritual do for you?

P 2.2: I think it felt relaxing.

29. R: What was your favorite part of this experience?

P 2.2: Probably unwrapping it. I felt so delighted in all of that, in appreciating all of the packaging that you have made. That part was really nice. It was nice to have a little taste of that whenever I would be opening a little piece. I could imagine the ritual of opening the little pieces being even more wonderful if there was more of that wonderment about the initial packaging involved. Like having packages within packages, or if the paper pieces have been printed lightly with something that would also complemented the print that you used on the hanging. Because then you would all be opening something that in itself would be quite beautiful. Instead of a plain paper. I feel there could be more delight built into each little action, because it was such a nice thing to open the package in the first place.

30. R: You mentioned that you would definitely tell people about the blue tit, and that you knowing about the blue tit was very important. As an extension to the inquiry about the importance of the blue it, what was the impact of you knowing about that story? And was there an impact at the level of your thoughts, at the level of your actions?

P 2.2: It made me think about a craft history course that I've taken. We were looking at the slideshow and one of the slides was talking about this other bird (I don't remember what bird it was) that fills its nest with beautiful things that it finds, and that are often man-made such as shiny bits of garbage for instance. And it would decorate its nest, I think the exterior of its nest. The male would do it to attract the female, like 'look how nice my nest is, I have some shiny treasures'. And I think it was neat at the time to connect a behaviour that on a human level can be seen as maybe too frivolous. It was all about conspicuous consumption, so learning about that desire that humans have, actually being quite natural, you think 'maybe this is not something negative, it does exist in nature'.

So, it was interesting to read about the blue tit and it made me think about the other bird. I know the blue tit is probably doing that for great evolutionary purposes, trying to make its nest a healthy place to raise a family. That same sentiment is something that of course humans care about too, and people do that in lots of different ways. So, I liked this idea about something that could also be seen as a little bit vain or frivolous. Our homes are a reflection of who we are and we invite people in and we want that experience to be wonderful for our guests but also for ourselves, so you think 'how does my house smell? does it smell like I have two cats and a dog?'. The idea of wanting to neutralize things, going back to nature. Also, something about nature and the forest that is comforting but also feels nostalgic, and that's of course the movement that we see a lot through history: going back to nature, wearing natural fibres, whatever it is that makes people feel good. I was thinking about all of these things when I was thinking about the bird. Just your act of making you house feel calm and nicely fragranced is actually very natural, we see it in nature, and therefore it's okay if you are doing this yourself. It makes it feel positive.

R 2.3 Interview with P 2.3 adopting Artefact 2.3
[7 February 2018]

R: research student

P 2.3: third participant from the second adoption experiment

1. R: If you were to talk to your friends about the artefact how would you describe it?

P 2.3: It's a beautiful piece of textile. It's a digital print. And the print is very beautiful. It looks like there are all these multiple layers of floral shapes or shapes like jellyfish, gently moving. Every time you look at it you discover another layer. On top of the print there were stitched lines that the templates were attached to. The fragments were impregnated with essential oils, lavender and mint. I would also say that is an interactive piece, and I would also tell the story of the little bird, who takes elements from nature to put in their nest to purify its environment and that the piece is supposed to mimic it in my house.

2. R: Where in the home did you place the artefact and, why did you decide to place it there?

P 2.3: I put it in the bedroom because I was thinking that the lavender would have a soothing effect on sleeping habits, so I imagined myself drifting away in the lavender scent. And the mint would freshen it up, freshen the air.

3. R: Do you think the placing of the artefact affected the way you engage with it? If so, how did it affect it?

P 2.3: It was the last thing and the first thing I saw every day. So, seeing it was a nice start of the day. Also, I saw it when I fell asleep, because it was just across from my bed. And I wished there would be more interactions. I was disappointed that there were only six fragments. I would have liked to have this as a daily ritual.

R: I mentioned the word engaging. So, when you think of engagement what do you think of exactly?

P 2.3: Engagement is contemplating it. I always have a cup of tea in bed before I get up. So, I look out of the window at the moon or the stars, or the trees outside, and the piece was next to it, so it is just a nice way to step into your day by contemplating something beautiful.

4. R: What did you use the artefact for? Did it play any function in your home life?

P 2.3: Decoration, but also contemplation. Almost meditating, because I found the imagery was so soothing and I just loved the imagery. It reminded me of jellyfish and they were gently moving, so it was a very calming presence.

5. R: How often did you engage with the artefact? And, for how long?

P 2.3: The first day was the longest engagement. I was thrilled to have this beautiful package, which felt so precious and so beautifully and carefully, and thoughtfully put together. And then opening these gorgeous papers. So, it was very exciting to open it. Also, because it was so beautifully made I was very careful. And there was this element of 'oh, yeah this is going to be really nice'. There was this anticipation, which was also important. Just to be like 'oh, my god this is going to be really awesome'. So, I carefully opened it up and looked at it and looked for a place to put it. Then I decided it would go into the bedroom where it fit beautifully on that wall. And then I was very curious about the envelopes, so I examined the envelopes and I read the story. That was all so beautifully executed. I hung it and I opened the envelopes and I took out one fragment from the lavender, and I attached it. From the description, I thought 'oh, I have to figure out where it goes', but then it was quite easy.

R: Because of the scale.

P 2.3: Yes. And I really enjoyed unravelling it. I thought that was really thrilling. To have the shiny, beautiful colour threads and then you just pull. It was very satisfying. And then you open it up and it smells beautifully. So, it was a wonderful experience involving all senses. Which is unusual. Is always just visual, but this is visual, tactile and olfactory.

6. R: For how long did you have it in the home before you interacted with the artefact?

P 2.3: Right away.

7. R: What happened after you interacted with the artefact the first time? In terms of your interest towards it? What did it do for you?

P 2.3: I wondered what is going to be next in the envelope and that I would like to open them all up and put them all on. So, I had to tell myself 'no, you wait'. I thought the scent dissipated very quickly. That was on Saturday morning and by evening when I went to go to bed I thought 'oh, now I have all this lavender smell', but I couldn't actually smell it. So, I wish there was a way that you could impregnate the pieces yourself, a way you could add more essential oils to it, to make it stronger.

8. R: When were you most likely to interact with the artefact? Why do you think is that?

P 2.3: Weekend. Because there is more leisure time and evening. Just before going to bed. So, as I was going to bed I would see it and say 'oh, yes, I would like to add another fragment'.

9. R: Did other people interact with the artefact? In what circumstances?

P 2.3: No.

10. R: Do you remember what the artefact is about and did you remember the time you had it what is it about according to the description in the information sheet? Do you think that knowing about the narrative behind the artefact has any importance?

P 2.3: Yes, it does. I knew it mimics the behaviour of the little bird, the blue tit, to purify its nest. It made me feel good. I don't know if it actually did, but just the notion of 'that is what is supposed to do', made the whole bedroom feel cleaner or fresher. I don't have a lot of pollutants in my bedroom but I still thought 'oh, yes, anything bad that is here will be absorbed in these fragments'.

R: So, it has more to do with the way you perceived your environment, home, space?

P 2.3: Yes. It's like a plant. So, I have plants that I put everywhere which will purify the air and this is just another element like that.

R: So, if you were to say what is the importance of knowing that story, what would you say?

P 2.3: It makes it more personal.

R: What do you mean by that?

P 2.3: You have a connection. You feel you are more connected with nature [...] I feel like the little bird.

R: In which way you feel like the little bird?

P 2.3: Well, I kind of felt sorry for the little bird, because the little bird actually has to find the plants in nature and has to fly around and it is probably a lot of work to get it into its nest, whereas for me, you just gave it to me and you made this beautiful thing. And I just had to hang it up and enjoy it. So, I felt a little bit like I was cheating. It was very easy for me and I should work harder to improve the quality of my home.

11. R: The loose fragments are impregnated with essential oils. What did that do for you?

P 2.3: It was a beautiful olfactory experience. But, it dissipated too quickly.

R: How strong were they when you opened them?

P 2.3: They were strong, but not overpowering or anything.

R: So, it was pleasantly?

P 2.3: Yes pleasantly. I thought about putting it closer to my head, behind my bed, and I would lie underneath, that could maybe smell stronger. But then I thought 'oh, but then I don't see it' and I really enjoyed waking up and seeing it in the morning and in the evening.

12. R: The artefact references the flora of the natural world. What did this particular imagery make you think of?

P 2.3: I felt it is more like an underwater scene than flowers in a field. The colours reference the flora, but the shapes looked more like jellyfish moving around. So, it was a lot of movement and calm. Or like balloons, there was also something like balloons, but floating. Just, gently floating. So, it was really calm. And I enjoyed the layers, because every time you look at it you discover something else.

13. R: What do you think of the scale of the artefact? Was it easy to find a spot for the work in your home?

P 2.3: Yes, it was easy. I had the perfect spot for it. And the scale was great. It has a presence. If it was bigger it would be difficult to find a spot for it. If it was smaller it wouldn't have a presence. So, it was just perfect.

14. R: What do you think about the installation?

P 2.3: It was super easy.

R: if you were to have any suggestions about different ways in which it can be displayed?

P 2.3: I think that was great. I used t-pins, and then had it a little bit away from the wall. So, it was the space and then it had a little bit of movement.

15. R: How did you find the packaging?

P 2.3: It was so beautifully and thoughtfully put together that it made it like a treasure. And it made it really special.

R: The feeling you had when you saw the packaging and started unwrapping it, did it expand towards the way you engaged with the artefact?

P 2.3: Yes, just being more careful. Being aware. Treating it as something really precious and not just careless.

16. R: How did you find the activity? That is unraveling, opening the packages, putting the fragments on and so on.

P 2.3: It was fun and very satisfying. I loved opening it and smelling it. I loved unraveling. I thought that was really beautiful. And then taking it out and smelling it. And then going over and finding the shape, which was not hard and then attaching it. I didn't really have problems with attaching it, but sometimes it was hard to

reach because I had this drawer in front of it. It was a little hard to reach in the higher parts. I mean, I could take it down and do it on the table, but since I just had to make the bow it was easy.

R: Was it fine tying the threads? The little strings that were attached to it were fine for tying it?

P 2.3: Yes.

17. R: How did you find the timing of the activity? Do you wish it was longer? shorter?

P 2.3: Longer. So, I take it out and there were these three ties, and that was done in like two minutes, and there was nothing else to do.

R: Do you wish there were other steps, in between the moment you opened the package and the moment you put it up?

P 2.3: Yes. It would be nice to have options. Sometimes you are really busy and you can't, but for example on the weekends I would have been happy to spend a little more time. And that could be, embroider something yourself or add more scent or embellish the fragment. I could do a lot more. Also, because when you talked about this in the forms we filled out you talked about 'adoption' and 'hosting the piece' and that is almost like a person, like bringing in an animal to take care of. So, in my mind, I thought 'oh, yes, that is going to take time, so I have to devote time to it'. I made a commitment and I was ready for more commitment.

18. R: Interacting with the artefact requires a certain level of skill. Did you think that was appropriate?

P 2.3: For a textile person, yes. I did not have any trouble because I work with threads all the time, so making a knot or unraveling something is not a big deal. But I could see how for somebody clumsy it would be hard just the unraveling. I could see that the square knot can get tangled and then maybe you make another knot and then you get frustrated and you have to use scissors to cut it open. It is a delicate item to open, but I did not have problems.

R: Could you think of any similar action you would like to see translated in this kind of textile artefact.

P 2.3: What if you were involved with putting the fragment together yourself, applying the scent and then putting the ties on?

R: I was thinking about that when you made the distinction between the weekend and the rest of the week. It could be a kit where you actually get to make the piece, when you have more time. And then you have these other ones that you can use.

P 2.3: Yes, I think that would be nice because you are the artist and you gave it to me, but if I have input myself and alter the piece, that would be great.

19. R: What did the interaction with the artefact make you think of?

P 2.3: I added the fragments to improve the quality of my home.

R: What do you mean by quality?

P 2.3: The air quality, kind of purifying my home. And, how important it is especially in the bedroom. The importance of having a good night sleep and the importance of taking time to create an environment that is calming and relaxing and rejuvenating.

20. R: Did interacting with this artefact triggered some sort of discovery? Some sort of realization? While you interacted or after you interacted?

P 2.3: It emphasized the need for contemplation. Before I hung your piece on the wall, I had another piece in that spot. It is a beautiful Peruvian weaving, a scaffold weaving with four blocks and has no selvedge, and no fringe. But I just took it for granted, so having something there just gives you a new outlook. And, now that I put back the Peruvian piece, now I actually look at it again and I haven't looked at it for a long time. So, making little changes like that makes you more aware of your environment and that is really important. It is kind of the same with dirty dishes, or something. If you leave them long enough you don't see them anymore. So, it's great to refresh and have something new to look at and something new to contemplate.

21. R: Do you think that these actions have an impact on your home environment and the way you see your environment?

P 2.3: I think I just answered that.

R: So, if you were to say what is the impact, it would be to?

P 2.3: More aware, and to reinforce the need for that.

22. R: Where there any thoughts/actions that occurred as a result of these interactions? Did you start doing something else as a result of that interaction? Did you start to do something different?

P 2.3: No, not immediately.

R: What about later?

P 2.3: It made me think 'okay, instead of putting my Peruvian piece back (which I did) maybe I should put something else, and maybe I put every two weeks something else'. It doesn't always have to be art, or handmade. It could just be another picture or poster. Although, I really liked the idea of the scent, but it has to be stronger.

R: So, introducing something that it has in some way scent?

P 2.3: Yes. But it doesn't have to be visual. I could just buy lavender essential oil and just put it on a piece of felt and put it on my night table. Yes, I will do that.

23. R: How much attention did you pay to the level of dust in your home in the last two weeks?

P 2.3: I dusted everything before I hung it, more thoroughly than I usually do, and then again when I took it down.

R: That is before you brought the piece, because it was a 'guest' that you were bringing in and after because you had to take the picture. No other influences throughout the two weeks?

P 2.3: No.

24. R: How much attention did you pay to the fumes produced while cooking in the last two weeks?

P 2.3: We have a ventilation system, but I usually always turn it on when I am cooking something that smells strongly. And, it is too cold to open the window. That did not change.

25. R: What did you think of when you used cleaning products in your home in the last two weeks?

P 2.3: I did not think about it, but now that you mention it I think about using less and less abrasive, more gentle products.

R: Why is that?

P 2.3: Because, especially the lavender, but peppermint too, are both natural products and they freshen up the air, so why not apply that same principle to getting rid of dirt. Is like using baking soda and vinegar. But, vinegar is not very nice to smell.

26. R: What did you think of the artefact when you read the Adoption Form?

P 2.3: I was excited to be part of an experiment of your research. I was excited to be exposed to the scent. And, excited to have an art piece in my home.

R: Did you have any expectations in regard to the artefact that you would receive or what would happen?

P 2.3: I thought it would smell stronger.

27. R: What kind of people do you think might want to own an artefact like this and why?

P 2.3: Every household should have one. I think it would be good for older people who have lots of time to engage with something like that and beneficial to their health. I think children would benefit from it just learning about the little bird and smelling and exposing them to a tactile experience and more sensory experience. Everybody.

28. R: If you were to give the artefact to someone what would you tell that person about the artefact?

P 2.3: Let's say I would give it to my mum, I would say 'hang it in your bedroom, and then you can enjoy it every day and you can choose the scents and it will make you calm and relaxed and you have great enjoyment'.

29. R: What was your favorite part of this experience?

P 2.3: I think opening the package. That was just so exciting. Also, every morning I enjoyed looking at it.

R 2.4 Interview with P 2.4 adopting Artefact 2.4
Transcript [3 February 2018]

R = research student

P 2.4 = fourth participant from the second adoption experiment

1. R: If you were to talk to your friends about the artefact how would you describe it?

P 2.4: It was very beautiful. I really enjoyed having it into my home. I would say it is a textile piece that incorporated paper and oils and very lovely stitching, the crochet and lots of colour, lots of use of colour, which was very lovely. And a wide range of colour and textures. I would also maybe talk about the wood rods, and also about the fact that because of the way it is hung from the top two pins you could position it in a variety of ways.

2. R: Where in the home did you place the artefact and, why did you decide to place it there?

P 2.4: I live in a loft apartment and I have a bedroom that is right above my living room. I have a really nice beam that goes right in front of my bed but looks down into the living room so I hung it right there for the entire two weeks. I did however switch it part way through. I had it facing my bedroom for a while and then I thought that it could be nice if I could see it from the living room. So, I switched it around just to see what the difference would be and also to look at it from different perspectives.

3. R: Do you think the placing of the artefact affected the way you engage with it? If so, how did it affect it?

P 2.4: I think it did quite a bit. Especially because I turned it around partway through and I did notice a difference in the way I interacted with it both times. When it was facing my bedroom, I would see it when I woke up, when I went to sleep, or when I was getting ready for things. I also do a lot of work in my room too. I found that when it was facing my bedroom it was a lot less formal environment, and I would also see it at much closer point too. So, seeing the colours and the shapes up close it was very different than when it was switched to the other side. And when I was looking at it from the living room, it was much higher, so I had to look up anyway. It was a little bit different. I had to look up instead of looking directly in front of it.

R: So, when facing your bedroom, it was much more intimate, and a little bit more formal when it was facing the living room?

P 2.4: Yes, when it was facing the living room it felt like you were looking at it and analyzing it, because I would be standing to look at it. Whereas in my bedroom, I could see it from my bed. Maybe it's my relationship to the bedroom and the living room.

R: When we talk about engaging, that is physically interacting with it, did the way you displayed it, and where you displayed it change the way you interacted with it?

P 2.4: When I had it in the bedroom, I undid the crochets probably within the first few days. So, I was physically touching it a little bit more. When it was facing the other way, to the living room, it was after I went through that stage of undoing the threads and it was also further away so I could not touch it, unless I was in the bedroom. But if I was in the bedroom I would only see the back side.

4. R: What did you use the artefact for? Did it play any function in your home life? You were prompted to interacted with it but did it do anything else for you? Did it have a role? Did you think to use it in a different way?

P 2.4: I used it as a piece of art in my home. I did think that if it was something that I would have permanently in my home, I would probably try it in different spaces too, to see what would that be like. To me, it functions as something to beautify the space and make it very relaxing and enjoyable. I recently moved in but I still haven't unpacked a lot of things, so it is still a work in progress. So, it was wonderful to have a piece of art there, because now it looks very plain there.

5. R: How often did you engage with the artefact? And, for how long?

P 2.4: Every day, in the morning a little bit and usually when I get home from work, for a little bit and also usually before I was asleep or a lot between 6:30 to midnight. For the first few days it was a lot about touching it, and physically engaging with it, by undoing the threads. Also, admiring all the colours, especially as each one was unravelled and you see it as it unfolds. Also, the threads where actually a cool thing. I have a ledge that was very close to where it was hung and I kept a pile of the threads right near it. It was very nice having it there because you could touch it. Also, the paper petals after they had fallen off, sometime I would pull them out and look at them. That was also interesting.

6. R: For how long did you have it in the home before you interacted with the artefact?

P 2.4: I interacted with it from the get go. I walked it around my apartment the first night to find a spot for it (I recorded that as an engagement with it). It was about a day before I started unraveling the threads.

7. R: What happened after you interacted with the artefact the first time? Where you more inclined to want to engage with it again, or not? Why, or why not?
P 2.4: After finding a spot for it, especially after I unraveled the first petal and you see what is underneath it makes you want to pull all the other threads out. So, yes definitely.
8. R: When were you most likely to interact with the artefact, and why do you think is that?
P 2.4: I would say a lot in the morning before I was going to work, or waking up, because I would see it right as I woke up, so that is already engaging with it and that would be the time I would start unravelling the threads. Mostly in the morning, but also sometimes at night. A little bit of both actually.
R: Why do you think is that?
P 2.4: I guess because I am at home early in the morning, and also later in the evenings (after work). My apartment is very open concept so it was very easy to see all the time.
R: What about weekends? Was there a difference between weekends and the rest of the week?
P 2.4: A lot more on the weekends. I work on a conference presentation and I spend a lot of time working on it in the bedroom so I spent a lot of time looking at the piece because it was right there, and it was very nice to have something like that to look at. So, I would take breaks and look at it. Yes, a little bit more during the weekends.
9. R: Did other people interact with the artefact? In what circumstances?
P 2.4: No.
10. R: Did you remember what the artefact is about, according to the description in the information sheet? Do you think that knowing about the narrative behind the artefact has any importance?
P 2.4: Yes. It was about the blue tits and how they use lavender for their nest to keep out toxins. I did think about it a little bit especially at the beginning as I was undoing the threads. And as they gathered up, because I was thinking 'oh, this could look like a bird's nest'.
R: Was it important for you to know that? Did it do anything for the way you engaged with it or it could have been the same without you knowing that?
P 2.4: I think it was important because I did think about that a little bit. I am not sure it would have been different if I did not know that, but it did change my thought about the piece.
R: How did it change the thought?
P 2.4: When I looked at the threads I thought they looked like a bird's nest. I don't know if I would pick that up if I did not know that story behind the piece.
R: Where there any other thoughts that the story generated?
P 2.4: In relation to the lavender oils there were times when I was wondering if they were detoxifying my home. And, I definitely would not have put that together if it wasn't for the story.
11. R: The loose fragments are impregnated with essential oils. What did that do for you? Did you like that? Why, or why not?
P 2.4: It made me very curious about the piece, especially because as I was unravelling the threads and as they fell off I would like to smell them. Yes, I would smell them a lot when they would fall off. It kind of brought another element to the piece, not just visual but it was also like using another sense.
R: So, did you like the fact that they were impregnated with oils?
P 2.4: Yes, that was very nice.
12. R: The artefact references the flora of the natural world. What did this particular imagery make you think of?
P 2.4: I really thought that some of the shapes looked like birds and some like flowers, and there was one that kind of reminded me of an octopus. The one in the right bottom corner and that was a very dark purple.
13. R: What do you think of the scale of the artefact? Was it easy to find a spot for the work in your home?
P 2.4: It was the perfect size. Very easy to place. I could have placed it in a number of spots.
14. R: What do you think about the installation? Do you have any suggestions on how would you like this displayed?
P 2.4: I think it's a very versatile piece for displaying. It can be displayed in a varied number of ways, and it is very easy to put it up. Just putting those pins in was very simple. Also, the fact that it just needs to be hang from those two spots. You can position it in so many different ways.
15. R: How did you find the packaging? Did it play any role in your engagement with your artefact?
P 2.4: I thought it was very nice. Everything was very nicely put together, and I loved the little envelopes. And the little cards that came inside with the descriptions and the instructions, that was really nice.
R: Did it trigger any thoughts? Did it make you realize something about the piece? Did it come with a sense of discovery? Did that way of packing influence in any way what is it that you were asked to do?

P 2.4: I would say that as soon as the pieces fell off I would put them immediately in the envelopes and I left it like that the whole time. So, I think having it there really influenced how I interacted with it. The envelope is also open, (is not sealed) so you are able to take things out and put them back in so I think it did have an effect. Throughout I would take these out and look at them and smell them. This was very nicely made so you can open and close it easily.

16. R: How did you find the activity, the actual interactions with the artefact? Can you expand on that?

P 2.4: I enjoyed physically touching the artefact and I especially liked the aspect of taking off the threads. I thought that was a really great way of engaging with the piece and also make it my own because it developed as I undid the threads. Making it my own in the sense that it will transform at my rate, so it was very nice. Also, physically engaging with the petals and the threads it was interesting, because there were all these kind of textures and different parts of the piece too. So. It wasn't just one dimensional activity, there were multiple actions and engagements.

17. R: How did you find the timing of the activity? You just made the distinctions between different types of activities: pulling the threads, but also engaging with the envelope. But if you were to talk about the actual pulling off the threads to undo the crochet and to reveal the painted flowers, what would you say of the timing? Do you think that was long? short?

P 2.4: At the beginning, I thought I would pull one off every day, and would do it very slowly, but after the first day I pulled one off and it was very cool. You pull it off and the leaf actually falls down and you have this beautiful thing revealed, so it kind of went very fast from there. I did not do it all at once, but I think there was one point when I pulled four off. I would never pull the petals right off, I would let them kind of fall. There were a couple of times when I did not touch them and they would fall off. It went faster than I imagined at first but that's okay. I am glad I did it that way because I really enjoyed looking at all the colours and all the shapes afterwards, and I think that if I would have done it very slowly I would have not gotten to admire it so much. Maybe it would have been very nice to also prolong that.

R: What do you think it would have happened if you would have it for six months? Larger scale, or even at this scale? What do you think it would happen?

P 2.4: At this scale, I think I would have probably done it at the same rate, I would have pulled them off. Or maybe I wouldn't have since I knew I had more time. I guess my engagement with it afterwards would have been a lot different, or throughout time. I would have probably moved it around my apartment a lot more. To try it in different places and also there would have been other people maybe engaging with it. I guess on a huge scale, the whole engagement would have been pulling off the threads, more than my reflections on it.

R: Do you think that the fact that you were given a timeframe of two weeks changed the way you interacted with it? Do you think it would have been different if the piece would be yours and you would have it for a long period of time?

P 2.4: If it was something that would be in my home forever I would have probably unraveled the threads at the same rate, because I get curious. I don't know if I would have done it differently.

R: Did the timeframe impose some pressure on you? Where you like 'I have this for two weeks only, so I have to do something with it'?

P 2.4: It did, especially at the beginning, after I pulled off the first one I saw that underneath are all these petals, so I thought 'oh, I probably want to get to those before the end of the two weeks'. I don't know what I would have done if I had it for longer. And also, because it was something that I was actively doing, like engaging with the piece. If it was something that was just in my home passively, maybe it would have been a different experience.

18. R: The engagement with the artefact involves a certain level of skill. Did you think the level was appropriate? Do you think it should require more/less involvement?

P 2.4: I thought it was okay. I am not an artist myself so I found this easy to engage with.

R: Did you wish you had something more challenging, or do you think the way it was, was appropriate and it just worked for you?

P 2.4: I thought it was good. I enjoyed how it was.

R: Could you think of any similar actions you would like to see translated in a textile artefact? When you were interacting with it did you have any thoughts, like 'what if this would be done in this way?' Where there any variations in terms of time, skill, materials, etc.?

P 2.4: One of the threads got stuck when I was pulling one off and that changed the way I engaged with it, because I had to mess with the thread a bit to get it to come out and it did pretty easily. Maybe if it was stitched differently, that would have changed the way I engaged with it.

19. R: What did the interaction with the artefact make you think of? Not only the engagement with it but also the interaction? What you thought of when you were looking at it and when you were pulling the

threads when they would fall off, when you would see what is there? The whole idea of having a piece in the home that you had to interact with and required some sort of action. What did that make you think of?

P 2.4: Pulling off the threads and having the petals fall is like the petals that fall off from trees and they would spin down. The first petal that fell off, or one of the ones after that, when it fell down (because they would all fall in my living room, because it was directly above my living room, so they had a far way to go down) it did a spinning, just like a tornado, like flower petals falling, or when it's windy and they do that action. It reminded me of that. And then looking at the piece, a couple of them reminded me of birds and flowers. The background, the beige colour, more jagged, the linen that was stitched in there reminded me of bursts of sun behind the flowers.

20. R: Did interacting with this artefact triggers some sort of discovery? Some sort of realization? So, talking more about the idea of having this object in the home that required this interaction from you, did that and the fact that you had to interact with it trigger any sort of discovery in relation to your home?

P 2.4: I really enjoyed how it brought the natural home into an indoor space. Especially because it reminded me a lot of the natural world (the leaves and the flower petals). I definitely thought of different ways of bringing that type of world inside my home. I think that last weekend I went and bought a big bag of potting soil and I am going to start planting some flowers.

R: Is there anything else? You just mentioned different ways of bringing the natural world into your home one of them being planting flowers.

P 2.4: Also, because I really like the smell of these petals, using more natural oils into the home is something that I want to try. I think I might get a diffuser or something of this kind. I never had one, but this project kind of sparked an interest.

21. R: Do you think that these actions/interactions with the artefact have an impact on your home environment?

P 2.4: It did, because I actually did go out and buy some soil. I was telling you how I did not unpack a lot of things. I have some art in some boxes that has to go up, so I started putting stuff up because it was nice having the piece there so it was a reminder that it is much nicer to have things on your walls than just leave them blank. Making my home a home is something I put on the back burner, so having this piece in my home reminded me that engaging with your space can make a huge difference in my impression of it.

R: What do you mean by your impression of it?

P 2.4: Up until I put this in my home it was a space where I would wake up, go to work, come home, and I hadn't really thought of it as a home yet, whereas after having this piece there I see it as a place where I can engage with things, and myself. I can make it my own space. And I think that is positive. It was a reminder that taking the time to beautify my space and having parts of myself or things that I enjoy being around really has a huge impact on your life and it improves your mood.

22. R: Where there any thoughts or any actions that occurred as a result of the interactions with the artefact? Did you start doing something else? Did you start doing some things differently? Did you start doing something that you did not do before?

P 2.4: The potting soil is one thing. Unpacking some things maybe faster than I would have done it normally. In addition to the other things I already talked about, it also made me think of the types of art I would like to have in my home. I never had a piece like that in my home: a textile piece. So, I am thinking of engaging with that type of art more, and having it in my home. And, the way I look at art and I engage with it in my home. It was cool having something that I could touch and unravel at my own pace. It made me think it might be cool to do something like this again in my home, have something like that again. It does not have to be the same thing but it would be objects that I could interact with or art that I could interact with. It changes the way I engage with my space.

23. R: How much attention do you pay to the level of dust in your home in the last two weeks?

P 2.4: Quite a lot, although I do pay attention to dust quite a bit anyways. I keep my home pretty clean. I can't stand messes or dirty dishes for too long. I don't like having piles of things around. I don't like having dusty surfaces, but I did pay quite a lot of attention to it in the last couple of weeks, especially in the bedroom because I was engaging with the piece there. But I would say that on a general level I do, I dust my surfaces every week.

24. R: How much attention do you pay to the fumes produced while cooking [or if you have any smoking in your building] in the last two weeks?

P 2.4: I did think about that quite a bit, especially because of the story of the blue tit, and how they use the lavender to expel toxins or keep them out. I can smell what is around me. Somebody in my building smokes

and I can smell it through my vents and it really bothers me. I did think about it a little bit more during this time period, just because smelling the lavender is very nice. I do pay attention to cooking smells too, fridge smells. So, I did notice quite a bit of that.

25. R: What do you think of when you used cleaning products in your home in the last two weeks?

P 2.4: It made me think about using natural cleaning products. I usually try to buy natural cleaning products but some things I don't and I started thinking that I should, like bathroom sprays and stuff, sometimes I buy the chemical stuff. I used to use vinegar which is pretty good at cleaning, I haven't using it in a long time but I did think of switching back to doing that.

26. R: What did you think of the artefact when you read the Adoption Form?

P 2.4: It peaked my interest. I thought it would be an interesting experience. I also wanted to see what being in the research process of this type of things would be like. I am interested in how other people do research. Seeing the pictures really peaked my interest to that. Maybe if I hadn't seen those pictures I might not have done it. The description was very good, when talking about what the process was and the project.

R: Where you surprised when you got the artefact?

P 2.4: I wasn't very surprised at first when I first saw it. It reminded me of one of those images that were on the Adoption Form. But when I started pulling the threads it was a completely different experience. It changed the way I looked at it. And I did not expect the different parts of the piece: the petals, and the threads. I was surprised at the different aspects to it.

27. R: What kind of people do you think might want to own an artefact like this and why?

P 2.4: Anybody. I can't imagine anyone who wouldn't enjoy that. Maybe parents of very small children need to be putting the pieces that are falling off away, in places that children cannot reach. I could see those as being a choking-hazard. Also, people with pets, because dogs for example like to bite things. Because my engagement with it consists in letting the petals fall naturally, if I had a dog or a cat that might be a problem.

R: Is there a particular category of people that would benefit from or enjoy having an artefact like this around?

P 2.4: As a person who is new to my home I really enjoyed it, especially because it really improves my engagement with my space. As someone who is new to my entire surroundings it was nice to have this beautiful object to engage with every day. This made me think about my space and what I do with it, so maybe people moving in into new spaces might be a particular group of people. Also, people who really enjoy scents, and textures.

For children, it actually might be interesting. Not for a super young kid who can eat the pieces that are falling off the floor, but for an older child who has grown out of those things. It can be a really educational experience for a kid.

R: In which way educational?

P 2.4: This type of thing would be a really good way for kids or younger people to engage with art. It would make them think about art in a different way, rather than something they are passively looking at. Even as an adult, I sometimes see art (especially as someone who is not an artist) a lot of the times as something that I am looking in on, rather than I am a part of. I think this type of exercise could be really good for the public. I could see this type of activity in a public library, letting people engage with art in a new way. I really enjoyed it. I would do this again in a heartbeat. And I can't imagine anybody I know who wouldn't. I thought it was great.

28. R: If you were to give the artefact to someone what would you tell that person about the artefact?

P 2.4: I would tell them how to engage with it. If I did not have the instructions I would not know to take off the threads. I would have left it as it was. Also, to be creative with how it's placed, because it has a lot of options for being placed in the home, because it is very versatile. I personally really loved looking at it in the morning and at night because I saw it in very different ways because you could see it with the sun coming through rather than the dark, so it was a very different experience, so maybe I would tell someone to really pay attention to the light that is hitting it.

29. R: What was your favorite part of this experience?

P 2.4: I really enjoyed the whole process. My favorite part was unraveling the threads and discovering this new layer to the piece. I thought that was super enjoyable. That really made me think of different ways to look at it. The interactions also made me think of how I look at art and also changing the way it's placed to change my perspective of it.

R 2.5 Interview with P 2.5 adopting Artefact 2.5
Transcript [8 February 2018]

R = research student

P 2.5 = fifth participant from the second adoption experiment

1. R: If you were to talk to your friends about the artefact how would you describe it?

P 2.5: I would describe it as delicate. That is the first word that comes to my mind. It was very interesting to see a delicate background and thicker embellishments. Normally you see the opposite. So, that is the first thing I noticed and it would be first thing I would tell my friends. I would also mention the sandwiching effect of paper and textile. I really loved that. So, I would tell them many things about that, and the delicate, organic floral nature of it.

2. R: Where in the home did you place the artefact and, why did you decide to place it there?

P 2.5: I put it just above my desk, and one of the reasons was that, that is the space I look at quite frequently and I wanted to interact with the piece. It is also visible from my bed, so I could see it at times when I am just relaxing as well. And, obviously if I am working at my desk it's right there, in front of me. It would get more interactions than another spot, which was kind of in the hallway where I would be more likely just to walk past.

3. R: Do you think the placing of the artefact affected the way you engage with it? If so, how did it affect it?

P 2.5: Absolutely. When my desk was messy I interacted much less, so on the days that my desk was messy I found it much tougher to even look in that direction, because I knew there was mess I had to deal with; just piles of books and stuff. So, I noticed much more interaction when my desk was nice and clean and I just felt more welcomed into that space. But, it also made me clean up my desk. So, it was good.

R: Why do you think it made you clean up your desk?

P 2.5: First of all, I did agree to interact with the artefact, so I thought I really should be doing that and I should have a clean desk because I know that affects me. And also, just visually, I find clutter very annoying and stressful. I like to see very plain surroundings, very clean, quiet kind of looking. And stacks of books and papers are not quiet. So, I would rather see something lovely in my home, and have that calm me down as opposed to stress me out.

4. R: What did you use the artefact for? Did it play any function in your home life?

P 2.5: Definitely stress relief. I found just looking at it very calming. I found unraveling the pieces interesting too, but I actually preferred them as they were, so I did not take them all out. And, I was sad when I was taking them off because I really enjoyed the way it was, both the tactility and the look. So, it was calming, but at the same time I feel like I would have interacted more and found it even more calming if I had time to add to it, or something like that, as opposed to just taking away.

5. R: How often did you engage with the artefact? And, for how long?

P 2.5: Most days I at least looked at it because it was right there waking up and going to sleep. That was quite normal for me to do almost daily. I was very sick with migraines for a few days so I did not look at anything during those days. But, most days I did, at least look at it. I also spent a lot of time just touching the materials. I am very tactile. Touch to me is just as important as vision, and definitely the feel of those layers was very interesting. I found it worth interacting with.

6. R: For how long did you have it in the home before you interacted with the artefact?

P 2.5: I got home late at night the day you brought it to me, so I did not put it up until the next morning. I wanted to hang it in daylight. Just to make sure it got enough light during the day and I could see it properly. And then I spent some time looking at it and thinking about it right after I hung it. So, my initial entry in your little book is much longer than the others because that contained my initial thoughts as well.

7. R: What happened after you interacted with the artefact the first time? Where you more inclined to want to engage with it again, or not? Why, or why not?

P 2.5: I had some things to think about. It was maybe in the back of my mind, maybe not conscious, but just a new thing at home, first of all, and just some of my initial thoughts kind of stayed in my head. My responses to it. The idea that something so delicate can actually be a piece in your home. Normally when we see furniture decorations we tend to think about their durability, whereas something so floaty and delicate does not strike me as typical for a home environment. So, I was thinking about that. Delicacy is something I work with artistically. The idea of delicate materials and the strength in being delicate. So, I thought about it just in my own artistic response to that quite a bit in the first day. The days after probably at least once a day. But it wasn't always conscious.

R: After you interacted with it for the first time, apart from the thoughts that were triggered, where you more inclined to want to engage with it again, or not? Why, or why not? On a scale from 1 to 10 what would you say?

P 2.5: Definitely very inclined to handle it. On a scale, probably 9 or 10 out of 10 because I definitely gravitate towards things that feel interesting. Visually very inclined, I would say 10 because I thought it was very beautiful and the colours worked well with my home environment, but they were also just really calming. I included those colours in my home because of the calming effect. So, I found it very pleasing.

8. R: When were you most likely to interact with the artefact? Why do you think is that?

P 2.5: In the mornings and in the evenings. The bulk of the day is usually taken up by projects, or duties or errands, or cleaning or whatever else and my thinking times are usually right when I wake up and sit with my coffee and let my brain defog. Or, in the evenings. I tend to read or write in the evenings, or work in my sketchbook. During those times, I look around a lot more while I am thinking. It's in my field of vision so I am definitely starting those interactions at that time.

9. R: Did other people interact with the artefact? In what circumstances?

P 2.5: No, actually. I very rarely have anybody over. But, I did tell people about it. I told some family and friends what I am doing, and I mentioned the project, so verbally yes.

10. R: Did you remember what the artefact is about, according to the description in the information sheet? Do you think that knowing about the narrative behind the artefact has any importance?

P 2.5: I did think about it some of the times, maybe 75% of the times just because when I opened the package, that was the first thing I interacted with. You had the explanation there, so that description stayed in my mind. I did think about the nesting behaviour just because of the nature of the task: pulling out something very thin and fine and the idea of unraveling. And, related to the layers, the idea of building up as well. So yes, I did think about it. As to whether or not it had any effect, I don't know. I suppose it did.

R: Did it had any importance for you?

P 2.5: Growing up in nature I observed a lot of the behaviours of animals. That was probably one of my main activity. I guess I felt a connection to that because of how much time I spent doing that as a child. I watched birds make their nest quite often. So, it felt quite special to even have the idea that I was doing something similar.

R: To what the bird was doing?

P 2.5: Yes.

11. R: The loose fragments are impregnated with essential oils. What did that do for you?

P 2.5: The first day, when I unwrapped it and hung it I definitely could tell the essential oils where there, but I also found they evaporated quite quickly. The first day I could smell them and after that I smelled more the paper and the textile than I did anything else. I did enjoy that smell was different in certain places on the first day but after that I could not tell anymore.

R: Did you like that? Why, or why not?

P 2.5: I did enjoy it. It is unexpected. You don't really think that something in your home that you interact with will smell when you open something (in a good way). So, it was pleasant and I think that if it were something that could be replenished then it would be even more pleasant.

12. R: The artefact references the flora of the natural world. What did this particular imagery make you think of?

P 2.5: The fields at home, at the farm where my parents worked. It was a small farm and it was just full of wild flowers. It wasn't heavy industry, just a couple of fields and then the mountains. I spent most of my childhood outside in those places, so a definite reminder. That is probably one of the reasons I found it so calming.

13. R: What do you think of the scale of the artefact? Was it easy to find a spot for the work in your home?

P 2.5: Definitely easy, because I don't have many things on my walls. I like it very simple and I did like the length of it. I do gravitate towards elongated shapes (I think they are elegant), so it fit well in the space above my desk. I have three closets at home and I don't use that one, so I took everything out and I made a little writing area and the perfect spot for it and perfect size.

14. R: What do you think about the installation?

P 2.5: It was easy. It is easy to put pins in my walls. It took me two minutes and I just had to make sure it's straight.

15. R: How did you find the packaging? Did it play any role in your engagement with your artefact?

P 2.5: I loved the packaging. I felt it had (I wrote about it in the little book) a ritual element to it because of all those layers and again, it was made of delicate materials. So, you have to be careful with delicate materials. Not everybody is, but I find that my response to a delicate material makes me be more careful. You noticed I

wrapped it the same way you gave it to me. I really took a little extra time not to destroy the way it was put together. And, the materials definitely made me respond that way. And the way it was packaged, the layering of it. I liked that each time you unwrapped something there was something to see. That was fun.

R: If you expand a little on that (the way the packaging functioned) do you think that way of packaging had any effect on the way you interacted with the artefact, and the way you perceived it?

P 2.5: The idea of delicateness definitely carried over. I wasn't expecting this really transparent material that it was made of but now that I look back, the packaging hinted at it, even before I opened it. So, it was already in my mind that I was going to have to be careful with whatever is inside. And I think the idea of layers is something that I personally find fascinating. So, that again made me think that you don't necessarily know everything about a piece of material culture until you actually physically interact with it, maybe you take things away and you reveal something else. So, I think it did but not in an obvious way. It was kind of subconscious.

16. R: How did you find the activity? That means, the pulling of the threads, releasing the scent, letting them fall and all of that.

P 2.5: The pulling of the threads was fun. First of all because I crochet as well and I stitch. Normally when I put something on the wall that has been handmade and handstitched you wouldn't unravel it, so it felt very taboo, to actually pull something down. So, in that sense it was fun. It was also cathartic, ripping something. I don't know if you use a stitch ripper. I use one quite often because I use reclaimed textiles, so I am ripping up old clothes, or whatever I find and I love undoing something as well. There is a part of my head that just loves, not destroying things, but disassembling, with the knowledge that it changes the nature of whatever the object is, that you are taking something away. So, there is something compelling about that I guess. And, also it made an interesting sound. When you unravel, it's got a vibration to it, as the stitches unravel and I really felt that through the thread, so I definitely felt that. That was interesting. And then it made a picking noise, when it left the paper, right? I don't know if I loved that or hated that. I am kind of on the fence about that noise. But it was fun. I had fun doing it. I also very quickly realized that visually and sensory wise overall I prefer them intact. So, I would have either added to them or left them as is. I performed the activity partly out of curiosity at least the first time, and then after that I thought 'well, I enjoyed the activity but I think I enjoy more just the layers of it, than the activity'. That kind of surprised me, I thought I would enjoy the unraveling more. And I encountered some knots, so I thought that was interesting because the nature of that type of thread doesn't really lend itself to knots, it's more of a slippery thread, so I was wondering whether they were placed there or whether I made them as I was pulling. Some of them I had to clip, in a couple of spots, but a few of the knots I just undid. And, that was fine. And some of them were totally fine. The really bad ones I found a little frustrating but I enjoy untying knots. I am one of the strange people that used to work for a jeweller and they would always give me the chains to untangle. It's not a big deal.

17. R: Did you wish the activity was longer? shorter?

P 2.5: I do wish it was longer. The last week was a busy week, so there was no much time for extended interaction, but I think that if I had the piece in my home for longer I would add to it. I would definitely add to it. I would maybe put more essential oils, more paper, more layers, different pieces, threads and materials. I am going to miss it in the spot it was, I am going to have to make something to put there now. I did find it inspiring for my other work, just to look at that and think about it. If it was longer I would have interacted more and in different ways.

18. R: The interaction with the artefact involves a certain level of skill. Do you think the level was appropriate?

P 2.5: I think so. One thing that might impact some people is if you do encounter a knot that you have the vision to see to untangle it. I have very good up close vision. Other vision no, but up close I have very good. So, I don't need magnification to undo the knots. Unless they are super tangled, I can undo them with my fingers. I did not have a problem, but I could see how maybe someone who needs reading glasses might have a problem. Crochet unravels very easy for the most part, so I know a lot about crochet. I have been doing it my whole life. But someone who knows nothing I think would experience it much the same as I did.

19. R: What did the interaction with the artefact make you think of?

P 2.5: Definitely being a kid, because it reminded me so much of the fields I used to play in. But also, because of the transparency of the backing material, it made me think of wind and air. I was in Iceland staying on a farm on the Arctic Circle for a little while. The work reminded me of the sort of wild flower type areas, the areas that are not cultivated, where stuff grows wherever and the growth is very spontaneous, because they were visually similar.

The sense and feel were similar and I tend to associate those areas with wind as well. Both places were constantly windy, so I think in my mind (especially having to spend so much time in those environments) the

connection is automatic, and it is very strong. So, I don't think I imagined much else because that one image was central.

20. R: Did interacting with this artefact triggered some sort of discovery? Some sort of realization?

P 2.5: Yes. I realized I need to spend much more time investigating both intellectually and artistically the idea of layers. It also emphasized that eventually I need to move out of city because living in nature was always home for me growing up, living in the city never really feels like home. That was kind of the main idea.

21. R: Do you think that these actions have an impact on your home environment and the way you view your home environment and the way you see your home environment?

P 2.5: The way I see it for sure, because of the taboo nature I mentioned earlier of undoing something that you've put up as decoration. That opens up a lot of possibilities in my mind for making home things that you can actually build and unravel or deconstruct in some way. I am really prone to dissociating for my environment if I am stressed out or if I am tired or sick. I just block everything. So, the idea of interactive pieces is probably a healthy one to stop that blocking and not only calm yourself down or put yourself into better spirit but also this dissociation is never healthy, and we do it too much especially in the city.

R: When you talk about dissociation and the artefact working the opposite way, would that mean the interactive artefact encourages more connection?

P 2.5: I think it would. Definitely, the placement of the piece is important, because when I pile my desk with books I found that a barrier. So, if I had placed the piece in a place, say on a wall where I had no desk with books in front of it (if that was the space where I would spend a lot of time), would probably be less of an effort to get close to it and work with it. It was a different experience. I was surprised by some of my responses to it, so I can't really say how I would respond to something else, say a pillow or a piece of furniture that you can take apart. I don't know how I would respond to that because I haven't been in that situation yet. There's always some sort of surprises.

R: My question was not making reference to having an object doing the same thing, but just your reaction to your environment. You were talking about dissociation normally and you said we do that too often so then this piece works in the opposite way because it requires you to connect with it so if it works against that idea of dissociation then would that mean it works towards connection?

P 2.5: It definitely made me think more about what I put on my desk, and how those piles of sketchbooks (or whatever papers I am dealing with), how would that stress me later on, so I definitely kept my desk a lot cleaner than I would normally. And, it made me engage a little bit more, I would have liked to engage a lot more with my home. But it definitely helped, at least a little bit most days for me to just even have that thought in my head. You know, engaging with the stuff at home. For me tactility is very important so, just making a point to touch the things around me, either make the bed or prepare food, or everything like that, to interact by touch is the most important antidote for dissociation for me. So, it was helpful in that sense.

22. R: Where there any thoughts or actions that occurred as a result of these interactions with the artefact? Did you start doing something else? Did you start doing something different?

P 2.5: Usually after the interaction I made notes, that at certain times led me to work on my projects, both writing and creating pieces. Usually afterwards I would do some activity, if I wasn't going to sleep, because in the evening I would read a book and just fall asleep. If it was during the day I would work on something. So, it inspired a little bit of industry.

R: What was about it that inspired that?

P 2.5: The idea of interaction, of something happening. When I handled something like that I thought 'okay now I am already performing an action, may as well do another one, and continue that interaction with my environment'. It helped the dissociation aspect.

23. R: How much attention did you pay to the level of dust in your home in the last two weeks?

P 2.5: Quite a bit of attention. As to actually have the time to deal with it less so. But yes, I paid quite a bit of attention to the level of dust in my home, because my house produces way too much dust and it is unfortunate.

24. R: How much attention do you pay to the fumes produced while cooking in the last two weeks? Or if you have any smoke problems in your building?

P 2.5: I have a lot of food allergies, so I live very close to the exit door of my building and I just go when I need to. With fumes, I definitely have an issue, so for me when I cook is not a problem, I put the fan on. But, I am always really cognizant of cooking fumes because they can make me very ill, so it is a pretty constant thing.

25. R: What do you think of when you used cleaning products in your home in the last two weeks?

P 2.5: Cleaning products usually for me is vinegar and baking soda, essential oils, that sort of thing. I am very allergic to a lot of chemicals, so that is what I always used and if I do have to use anything chemically I

definitely feel it, I can't breathe or I start sneezing or coughing. When you use those regular cleaning products you can almost taste the chemical scent. I am not a fan of it, so I don't actually use them.

R: You mentioned the essential oils, is that something that you have been using for a while?

P 2.5: I find most of them quite safe for me. For example, peppermint and lavender is something I use all the time. I use them in my hair or in my bathroom (I have a diffuser so I used them in there as well). And lavender for example helps with mould, so I tend to use lavender when I am cleaning my bathroom, just as a preventative. Is something I always think about. Just because I didn't grow up in a household that used ton of chemicals. It is not natural for me to do that now.

26. R: What did you think of the artefact when you read the Adoption Form?

P 2.5: I was curious whether it would be one in the photos, or if it would be a different one. I wondered about how it would feel in the hand, because that is really important to me. You mentioned interaction and I really wondered whether it is going to be tactile or not. That was probably my biggest question. And, I was pleased to find it was.

R: How was it when you received it and you actually saw it?

P 2.5: The delicacy surprised, but that was pleasant. And, I really loved the layering. I felt very ritualistic to open the layers one by one. See something new every time, seeing the different materials one on top of the other. It definitely felt very feminine, which is something I personally enjoy a lot. That was kind of a relief too. A lot of home furnishings and a lot of the design aesthetic is quite angular and a little bit cold. As interesting as it is or pleasing in certain aspects, it definitely lacks the sensitivity that your piece had, so I found that a huge relief, that is, to see something that light, delicate, unexpectedly transparent and very interesting with those layers.

27. R: What kind of people do you think might want to own an artefact like this and why?

P 2.5: I think anyone (male or female) with a curious nature would want to own something like this. And anybody with an appreciation for detail, and an appreciation for delicacy. I think that if you were a little bit of a vulgarian and you don't care, I think you wouldn't be a good person to own such a piece. I have to say curiosity is the biggest quality.

R: Why is that?

P 2.5: Just because if you are not a curious person I don't think you would interact with it in the same way and you probably wouldn't get the benefits of it, as much as a curious person would. I felt that curiosity is important when I interacted with the piece, and discovery is important. So, if you don't care for those things maybe you wouldn't make a point to interact with it at all. This is just speculation, I don't know.

28. R: If you were to give the artefact to someone what would you tell that person about the artefact?

P 2.5: I would tell them to spend time with it, first of all. I would tell them how to unravel the pieces but I don't think that would be the main thing I would tell them, because I got more out of it in other ways. I think I would leave the nature interaction up to them, but I would tell them 'spend time with it and don't think that anything you do with it is necessarily wrong, like unraveling can be wrong in a lot of ways, when it comes to home décor, right? So, open your mind when it comes to what's allowed and what's not allowed with a piece on the wall'.

29. R: What was your favorite part of this experience?

P 2.5: The layers. The layers were my favorite part hands down. And, as surprising as the transparent backing was that also turned out to be one of my favorite parts, the transparent backing and the crochet sandwiched pieces. I liked them intact, much better than I liked them unraveled, so before unraveling, those parts were also my favorite.

30. R: What do you think this piece did for you? Having it in your home for those two weeks?

P 2.5: It was definitely a lovely stress relief for me. It inspired a lot of thought philosophical, artistic, personal...you name it; a little bit of identity questions; and, it also made me realize that I probably should decorate a little bit more than I have, to put some things that I find lovely on the wall, not a ton but a few. And, it opened my mind as to the purpose of things in the home. Home décor is something I do eventually and what to get into it, at least partly, now and then. The idea of creation and destruction and using that as a purpose, when you make a piece opens up a whole new realm of design. It gave me many ideas, that was probably the biggest thing it did for me.

R 2.6 Interview with P 2.6 adopting Artefact 2.6 ('Nest Engagement')
Transcript [9 February 2018]

R = research student

P 2.6 = sixth participant from the second adoption experiment

1. R: If you were to talk to your friends about the artefact how would you describe it?

P 2.6: As a wall piece that was really attractive and that I could interact with by pulling out threads, which was really satisfying, and released very faint scent in the room. It was a floral line drawing with some appliques that were permanent and some appliques that had embroidered or crocheted silk colour threads over them and those seem to be the ones that released the scent. Although it was very faint. I don't have a very good sense of smell, and I was never overwhelmed by it but I noticed it. I also noticed it when I walked by. It was very pretty to look at. I felt it looked very nice in the house.

2. R: Where in the home did you place the artefact and, why did you decide to place it there?

P 2.6: I placed it right where you see it as you come in through the front door. So, I did walk by it all the time, when I was going to the basement, I walked by it many, many times per day. I was going to move it at some point, over by the sofa, because I thought that is where I sit and work on my computer, but I liked where it was and it was easy to reach to unravel it (which I am realizing may not be what I was supposed to do, but that is what I did). I liked walking by it. And I also thought that if it was by the sofa, I had to climb over a table and a lamp to get to it. Also, I put it there because I had things hanging on the wall already and somehow the hooks were spaced really well, so I didn't have to make a decision about putting it up leveled or anything like that. I just used the hooks that were already there.

3. R: Do you think the placing of the artefact affected the way you engaged and interacted with it? If so, how did it affect it?

P 2.6: Definitely, because I walked by it all the time. I don't know if I would have stopped seeing it if it was by the sofa. I would have just seen it with the corner of my eye and not thought as much about it, but walking by it I was like 'oh, I could pull these little threads'. And I like picky things, little detail things to look at or work at, so it was right down my alley.

4. R: What did you use the artefact for? Did it play any function in your home life?

P 2.6: Only that I stopped and thought about it, which is a nice thing, because most things in my house I have chosen them because I really like them, and I think they are attractive, but I don't think about them that much. They are just there, unless something falls down or the cat climbs or destroys things. It was just pleasant to walk by and think about it.

5. R: How often did you interact with the artefact? And, for how long?

P 2.6: I probably stopped and looked at it every time I walked by, so probably 5-6 times a day I walked by. But because I knew I had to write it down I just unraveled only probably once a day. Because I was a little afraid I would get carried away and I would get them all done the first day. Something like an advent calendar. So, every day I would unravel a little bit. And I tried to unravel the pink and the green at the same time.

6. R: For how long did you have it in the home before you interacted with the artefact?

P 2.6: I think the first day, right away. It was very engaging. I was wondering what I was supposed to do, then I realized they unraveled. I think being a weaver you always do those crochet chains to get the warp off the warping mill and sometimes it unravels easily and sometimes it doesn't. Sometimes I was 'oh, I pulled the wrong end, it is not unraveling, what do I do?'

7. R: What happened after you interacted with the artefact for the first time?

P 2.6: I think the first time I didn't notice the smell. You said on the label that the piece was about the essential oils, so the first couple of times I sort of thought 'is this releasing the scent?'. I think the first ones they didn't so much but then I noticed it after a few days. Maybe I had to warm up.

R: Were you more inclined to want to interact with it again, after you interacted with it for the first time?

P 2.6: It was so pretty and I walked past it many times. I thought the colour threads were really pretty and I think part of me didn't want to unravel them too much because I thought they would fall off which it turns out they didn't much. Sometimes the top layer fell off but only the last couple of days when I was finishing it. I think I thought the colours were so pretty that it might not be as attractive once they were gone, and I was just anticipating that they would all come out. Yes, that I wanted to keep the colour there so I didn't want to do it too fast.

8. R: When were you most likely to interact with the artefact? Why do you think is that?

P 2.6: I think in the evening, because I was home. And I was probably marching around the house more, doing laundry or putting away clothes, or was just more busy walking up and down the house.

9. R: Did other people interact with the artefact?

P 2.6: The only people I had over during those two weeks, were last night. I told them 'I have one of Elena's pieces! Do you want to see it?', so I showed it to them. They both thought it was attractive, and that it looked nice in the house.

10. R: Do you remember and did you remember while you had it what the artefact is about, according to the description in the information sheet? Do you think that knowing about the narrative has any importance?

P 2.6: Yes and no. I mostly remember it from your lecture. I think that if I had just read the card I might not remember as much. I had a moment of panic wondering which is the lavender and which is the peppermint on the early days when I didn't really smell it. But then I figured it out (you made it really easy): the green is the peppermint and the purple is the lavender. I thought about it after your lecture too, not just working with it. Is it going to be effective in that way? Is it going to purify the house? Although it was very nice to walk by it. Other biomimicry things that interest me are things like Velcro which is an imitation of thistles or burrs, or the lotus leaf effect that repels water. I sort of thought, those are real physical things as opposed to just your senses, so I wondered if it was as strong of a connection like the Velcro has to the burrs.

R: Do you think the narrative has any importance for the artefact, and for the way you saw the artefact, and the way you engaged with the artefact?

P 2.6: I think it was more the pleasant sensation of smelling something, rather than thinking 'now I am purifying my house'. And also, recently I don't feel my house is such a pool of allergens anymore now that my cat is missing. Because otherwise you are so aware of the cat, like hair everywhere. I also haven't been home as much so the house is pretty clean. I think it was mostly the enjoyment. I didn't think too much about the artefact purifying the house. But it was very nice to participate and then have that reward. The artefact looked really beautiful. The ones you showed in your lecture looked very beautiful too, but they seemed more like conventional prints, and this one was a little more engaging. I really liked that there were the spots with no embroidery too. And, I also knew that they wouldn't fall off so I thought 'if they fall off I don't know if I am going to like the line drawing as much'. But it was very attractive. Also, I don't interact with the other things on the wall. I think 'oh, that's a photo we took in Morocco, that is really nice', but I don't physically do anything to it.

11. R: The loose fragments are impregnated with essential oils. What did that do for you? The fact that there were essential oils as part of the piece.

P 2.6: They smelled good. I didn't really have an opinion one way or the other. I always wondered about essential oils because it seems like the same time the whole concern about scents and perfumes have come over, essential oils have become really popular. So, I've always thought 'what is the difference? Perfume is making everyone sick, but essential oils are making everyone healthy. What is the difference between the two? Why are the essential oils not making us sick?'. But I don't have any allergies like that so I just think about it when other people mention it to me, or when I see the scent-free environment signs. I liked scents and I am fine without them too. I don't buy scented laundry detergent or anything like that. But I do wonder why is one healthy and the other isn't healthy. But I wasn't worried about having them in my house. It was really a nice sensation.

12. R: The artefact references the flora of the natural world. What did this particular imagery make you think of?

P 2.6: It seemed like a nice drawing, a nice print. Not too symmetrical, not too stereotypical or anything, but just really enjoyable to look at.

R: What about the idea of referencing the flora, did that trigger any sort of thoughts?

P 2.6: When I was worried about figuring out which was the lavender and which was the mint, I thought 'mint is a leaf and they are green and lavender is a flower and it's purple'. But other than that, I didn't really make the association of plants making the house healthy. Although now that we are talking about it I feel like that bird brings plants into the nest and the nest is small, and the plants are small, should I be bringing something huge into the house? Like big pots of lavender? big pots of mint? And, I do grow mint in the summer but in pots outside, to make tea with. But now, that I talked to you I think 'maybe I should bring them in the house'. The oils made me think 'would the real thing be better? should it be huge, bigger scale?'.

13. R: What do you think of the scale of the artefact? Was it easy to find a spot for the work in your home?

P 2.6: Yes, it was easy. I could have taken a bigger one in my house, but I know from trying to sell big artwork that most people don't have room for big things, unless they are starting from the beginning. I was just able to take down a photo and put it up. It could have been floor to ceiling in that spot or the other spot where I did not end up putting it (there I just had to take another photo down and again floor to ceiling would have been

available). But I noticed when I go to other people's houses that they collected a lot of small things over the years so they would have to take down a lot of stuff. Also, because it was translucent, it could hang in space too. Also, it would move around more when you interacted with it. The first shape that I took all the thread out of I thought it's going to fall off and it didn't fall off, it stayed there. But then, when I handled it, when I got down to just a few I was pulling the fabric forward to unravel the little tiny leaves, I would pull it over to try to figure out how to unravel them and then some of the pieces started falling off. So, I can see with a big piece if you are brushing against it or if it was in space and you would have to put your hand behind it to do that, I could see how they might fall off faster. But I liked that they didn't fall off. But then the day I packed it up they started falling off and there might be more falling off now that I wrapped it.

14. R: What do you think about the installation? Do you have any suggestions on how would you like this displayed?

P 2.6: Bigger would work for me. But I thought the dowel with the two little screw eyes was really nice. I think that was good, because you could hang it from another string if you wanted, or two strings if you wanted to hang it in space. I probably would have used something more invisible but because I had two standard pictures hooks there that were perfectly spaced I just stuck it on there.

15. R: How did you find the packaging? Did it play any role in your engagement with your artefact?

P 2.6: The packaging was beautiful, designed and made with care. You unpacked it in your office, but I did think, that if I had purchased it I wouldn't feel any buyer's remorse! handling the accessories and seeing the details of the envelopes and packaging, the pins and book enhanced the experience.

16. R: How did you find the activity? The activity of having to unravel the fragments?

P 2.6: I love stuff like that. I find it very therapeutic. A couple of them did get stuck. So, it was a challenge 'how do I find the right end?'. The smaller ones were harder. Once I pulled the wrong end it was harder to get it going again. So, you'll see that I snipped some and even then, it was hard to figure out where it needs to start again. But then I decided 'I like the colour so it's fine, there's still colour there'.

17. R: How did you find the timing of the activity? Did you wish the activity was longer? shorter?

P 2.6: Once I started pulling one, I wanted to keep pulling. So, I could have unraveled more. But it was nice, this little passing distraction.

18. R: The engagement with the artefact involves a certain level of skill. Did you think the level was appropriate? Do you think it should require more or less involvement?

P 2.6: The ones that worked well, worked really well. But then the ones that I must have pulled the wrong end, I thought 'I've done this before, I know what to do'. But a person that didn't sew might think 'it doesn't work'. You could have instructions about that, like 'you could pull this up and do this'. That is easy to happen because the threads were so fine. Maybe if the threads were thicker would be easier for just anyone to figure it out. But that is something with crochets and the warped chains, that sometimes you pull the wrong end. I feel that is something really normal, like unzipping a zipper. That wasn't news to me, but it might be to other people. I think you could also just say that, that might happen. Or, you could label the end of the bow they were supposed to pull, like put a little sticker on it, or a bead. The weight of the bead might start unraveling it though.

19. R: What did the interaction with the artefact make you think of?

P 2.6: Working in textiles it made me think of sewing. It also, made me wonder how the oils were being released. Are the layers loosening it? Is the action of the thread popping through the paper? I thought I remembered from your lecture that they were just there, and faded with time, they just released the scent in whatever neutral way they do that. It was interesting that I could make that happen myself over time. Like a time-release, an interesting time release. But it wasn't like a time release with a timer, instead it was a manual release. I think it reminded me of crocheting, and at some point, when I was throwing away the thread, I thought 'I should be keeping the thread. This is so beautiful. I should do something with this'. I guess I could have added the thread back it, I could have embroidered with it.

20. R: Did interacting with this artefact triggered some sort of discovery? Some sort of realization?

P 2.6: I wouldn't have thought about it without you asking. But, I guess that idea that I just said, that you could somehow release things over time just by undoing crochet or sewing. I did wonder 'How would she replenish this? Would she have to crochet it all again herself? or would I crochet it again myself?'. I just wondered how it could be updated. It seemed like the one you showed at your lecture you could just pull out the papers, coat them again, put them back in. But I thought this would be quite a commitment to restore. Unless you rotated them (like an advent calendar): you can trade it back in, so you could have a second one for me and we could keep switching back and forth, but it seemed like a lot of labor. Unless it came with several little refills already crocheted and I could somehow easily attach them when one came off. But that would be quite a

commitment. Unraveling was fun, but to put it back on, that would go in the pile of all these things that I intend to do, like mending. Things that I intend to deal with and never happens.

21. R: Do you think that these actions (the unraveling of the crochet) have an impact on your home environment and the way you see your home environment? The fact that you had to interact with something in your home?

P 2.6: It was a pleasant interaction, as opposed to washing dishes, or putting things away. I am not very good at putting things away. I let things to get really bad. Now that you mention it, I could interact with other things in the house. I could create things that I could interact with. It could be like a calendar that you have to change the blocks or the day. It could think about making other things that you could interact with. You think of things that go on the wall that are purely visual. And that is a good reason to interact with something if you are releasing something. The things that I am thinking of, I am not sure why I would interact with them. You have to be motivated to interact with them, unless there is an immediate reward.

22. R: Where there any thoughts/actions that occurred as a result of these interactions with the artefact? Did you start doing something else? Did you start doing something different?

P 2.6: Not consciously, but I think I did more studio work during that time. Partly because I am going away and there were things that I wanted to get done. Also, it put me in that frame of mind, of working with thread, so I thought 'oh, I have something I should be sewing'. I think it did put me in this handwork frame of mind.

23. R: How much attention did you pay to the level of dust in your home in the last two weeks?

P 2.6: I cleaned the house before I went away, so I came back and it was pretty clean. But in general, dust is just there. I don't vacuum regularly. I vacuum when I can't stand it anymore. Or I call someone to come and clean the house when it gets really bad.

R: So, did you do anything different in the last two week?

P 2.6: No, I didn't do anything in the last two weeks, but there is also much less dust without the cat. With the cat, there was so much hair, you find all this hair and you are thinking 'oh, my god I can do another cat with all this hair'. It is just everywhere. I am new to not having a cat, so the house looks just pristine in comparison.

24. R: In the last two weeks how much attention did you pay to the fumes produced while cooking?

P 2.6: I didn't do tons of cooking, and I have a little bit of a ventilation problem in my kitchen (the exhaust fans don't work properly). I didn't really notice one way or the other. Again, my sense of smell isn't so good, so I don't really notice if they linger. But the piece was pretty far away from those. The normal amount I guess.

25. R: In the last two weeks, what did you think of when you used cleaning products in your home?

P 2.6: I didn't think about it at all. But, I do notice that when I open the cupboard under the sink I smell them, even though everything is closed and bottled up. Also, I just put up a medicine cabinet in the bathroom, and I noticed when I opened that (even though everything is in a jar with a lid on, and in the commercial package), that a poison kind of aromatherapy thing comes out. And it is even a big opening between the doors (it's a two-door medicine cabinet). So, I don't notice it when I am in the room, but if I open it to get a band-aid it's like 'wow'. I don't know what that does. Then I close it and I don't think about it anymore, until I open it again.

R: So, in the last two weeks that you had the artefact in your home, did that change in any way, or is it something that happens normally?

P 2.6: I think I didn't open it as much. It wasn't so near the artefact. If I thought about it, I would have moved into the bathroom to test it out, but I did not think of that. I think it did not bother me as much, now that you mention it. I think the bathroom medicine cabinet smell did not seem as strong.

R: Why do you think it didn't bother you as much?

P 2.6: Maybe it did have an impact. It wasn't far from the bathroom. It is possible that it had some effect, or could just be that I am getting used to the medicine cabinet smell. I can't even be thinking why would be smelling in there. Maybe more ointments, because pills don't smell, and liquid things, like mouthwash things. I am not sure what smells so much in there, but it smells.

26. R: What did you think of the artefact when you read the Adoption Form?

P 2.6: I thought more about the process. I thought it was interesting that you called it an artefact. What you call it can shape people's perception, so I thought it was interesting that you chose artefact. And then I reflected a little on PhD research and testing, and how you have to arrange this. It reminded me that I have a responsibility. I would have taken it anyway, the responsibility. But it felt like I was doing something important.

27. R: What kind of people do you think might want to own an artefact like this and why?

P 2.6: I think people interested in the environment and anyone who wants a beautiful handcrafted object in their house would love to it. There is an environmental store named P'lovers (P'lovers is a bird that is becoming extinct in Nova Scotia, but the name also references planet lovers, plant lovers, something that starts with p - lovers). They started by offering recycling solutions, nice things in your house where you can divide your recycling, some sort of household things. But it turned out that what people want where beautiful

clothes, accessories. They have ecological fabrics, but it's become much more a lifestyle store. I think that they would love them. Any store like that. Because a lot of stores like that have gone from real mechanical things, like recycling solutions (which I would love to have) to a regular shopping experience of just buying nice things for their homes.

R: You mentioned people interested in their (home) environment. Can you talk more about that?

P 2.6: I guess people interested in their environment in general, which can then take these things into their home. But I think general lifestyle, people who are not marching, but want to do something. They want to be improving their own environment, but also not having to be a hardship, because the artefact is so beautiful.

R: How do you think that artefact improves someone's home environment?

P 2.6: I think having beautiful things in your home makes a difference. I think whether you really noticed it or not, having a really beautiful, not fancy, but a considered visual environment is important. And interacting with it was a pleasant thing. Just to taking you out of yourself for a minute, and to suggest 'stop, just have some private interaction', mostly just 'stop for a minute'.

28. R: If you were to give the artefact to someone what would you tell that person about it?

P 2.6: I would tell them the story that you tell in the labeling. That is also something fun to participate with and that it smells nice. And that is hopefully purifying the air in their house.

29. R: What was your favorite part of this experience?

P 2.6: I think the unravelling. I was interested after your talk what the next step would be, and how it progressed and how it is all working. Seeing the pictures, I wondered how does it work. Not just instructively how does it work, but what is it like to be there? what is it like to have it in your home? how much does it smell? You mentioned something about refreshing them in a certain way. Celestial Seasoning Herbal Teas in Boulder Colorado have a plant tour. So, there are a lot of scents of all the herbs in there, but they especially had this walled off spearmint room, and it's astonishing how all sensory that is. I mean people have to leave, I couldn't even stay there very long. The oil is so pungent. I like spearmint tea, but the oils that are in the fresh products in these big fabric bails are too strong. You expect to see those little heat wave of things because the smell is so strong, and you don't see anything but your eyes water and you don't just smell it but you feel it in all the tissues in your nose. So, I knew it can be very strong.

30. R: What would you say was the benefit of having the artefact in your home? Was there a benefit of having that in your home?

P 2.6: The meditative quality of it. It was something new, and when I looked at it, it wasn't just 'oh, it's pretty! I just have something new. But I can also interact with it'. It was that stopping during the day, because I was walking by it when I was busy, like ironing something upstairs, going back downstairs. It was like 'stop just for a minute'. It was like stopping for a cup of tea but you did not have to fix the tea. And often I don't even remember doing that. I don't remember having the cup of tea. I look at the empty cup and think 'really, did I take a break?'. So, I think what was nice was just stopping, just pausing.

R 3 Interview transcripts from the follow-up interviews

R 3.1 Follow-up interview with P 2.2 Transcript [5 December 2018]

R = research student

P 2.2 = second participant from the second adoption experiment

1. R: How do you remember the experience of having the artefact in your home?

P 2.2: I remember it as an overall positive experience, but also as a very subtle experience. Because it felt really unobtrusive in my home. I lived with it in my living room for a period of a few weeks. I don't remember how long, but it was fun to interact with it when the timing meant that I needed to do that.

2. Could you please tell me what did you take out of it? Was there anything that stuck with you after returning the artefact?

P 2.2: It made me think about the potential of using essential oils in my house in a different way. I also sometimes think about how much I enjoyed the tactility of it (not so much that I have tried to find something to replicate the artefact) but the artefact has remained in my mind a little bit. Enjoying the fragrance of it, and also just having more textiles in my home, which I like anyway.

3. Do you find the experience had meaning? Did it have an impact in any other way apart from what you just mentioned?

P 2.2: I would say it had a subtle impact, and I mean that because it was very quiet in all of its characteristics, that is visually it was quiet, the act of adding a new little packet into a pocket was also a very calm, meditative experience. What meaning brought to me the time it was there was the sense of responsibility, even though I was unsure of what you were doing with it all. It was interesting to feel that I have this duty, that I was the custodian of this thing for a little while, and it was also kind of meaningful to have the responsibility, not only to take care of it but to also engage with it, time and time again.

R: What about after the time you returned it?

P 2.2: I've been curious about where your research has been going, and the bigger picture. Because I had insight into a tiny slice of it that I got to participate in. I also sometimes think about it because the holes in the wall where I hung it up are still there. So, I am thinking 'oh, I should hang something there'.

4. Are there any things you would change about this experience? Was there anything that you would have wanted to be different?

P 2.2: Overall, no. I was always thinking of it (and this is not the way you've been approaching it) as a product, a marketable product. So, there were things that I thought, like 'oh, this component where you are pulling out the stitching around a packet is really pleasant, but also maybe there is a way to make it more user-friendly', or 'how can this change a little bit to be more marketable?'. But, I don't mean to imply that that is the way you were thinking about it at all. But, in terms of the overall experience, the unpacking from this beautiful box, then hanging it into my house, the dimensions that seem to work really well for my space, I don't think there was anything that I would change about that experience.

5. How do you remember the artefact? Can you talk about how it looked and what it did?

P 2.2: It was a soft piece of fabric, I think there was a dowel at the top and a dowel at the bottom. And, you had printed it, silkscreened it with subtle botanical images, and then you've sewn little pockets onto it, that were in organic shapes that related in some way to the kinds of botanical images that you were using. Within those pockets there were some corresponding shapes, the same shapes that you can match these little satchels into each pocket. So that was a fun part of the project, that is opening this beautiful handmade paper box that you've made (I appreciate that a lot), and then unwrapping all of these little parcels of fragranced material. I don't recall what the material was but being able to unwrap them, they were soft and the place them each in their pockets.

R: They were paper.

P 2.2: Oh, they were paper! See, I am picturing them almost as being a little bean bag. And, they weren't, they were paper. This is how memory changes things. So yes, paper infused with essential oil fragrance. Yes, being able to slide those in. That is so interesting how my memory tricked me like that.

R: What exactly you remembered?

P 2.2: I was picturing, more like a bean bag. So, same shape as the paper, but some kind of cloth sewn together, holding it almost like a potpourri. That so funny! But no, it's paper. As soon as you say that, of course it was paper.

6. Do you remember what the artefact was about? If yes, could you please tell me?

P 2.2: You were talking about a bird that did wonderful things with its nest. It was collecting certain plants as a way to make its house safer, or pleasant. I am guessing because of antibacterial properties of the plants. But, I don't remember the name of bird.

7. The artefact was inspired by the nest behaviour of the blue tit female bird that was placing aromatic plants in its nest (as a way to keep their environment healthy). In a similar way, you had to add to a panel in your home fragments infused with essential oils. What did it mean to you the act that you were engaged in (that is, replicating a behaviour similar to the bird behaviour)?

P 2.2: New meaning came to me after I learned about the bird. Because I did not know about the bird right when I was part of the research initially. So, now that I can make that connection it has a different layer of meaning to me. But, I do think that it was interesting. It is all about the ritual to me. I was keeping all of the little packets in my closet, the fragranced packets, and pulling them out and going and matching them, and also trying to decide the frequency that I was going to pop them into the pockets based on the amount of time that I had the artefact. And then of course writing about it all. So, trying to meter it all out. I believe there were two fragrances, so trying to also switch them up. I would notice it right, because you stop noticing after a little while.

8. R: You said this came up when we had the previous interview. Do you still think about this, that is the fact that you were engaged in a behaviour replicating the bird behaviour?

P 2.2: Oh, I would have definitely replicated the bird behaviour, now that I know that is what I was replicating, absolutely.

R: But, do you still think about this? Or after you returned the artefact?

P 2.2: The idea of the bird has stuck in my head a little bit because I think that it is such an interesting pattern, that an animal would display in nature and that we also think about adorning our homes in different ways, right? I think there can be a lot of parallels that can be drawn.

R: So, you think about it in that way?

P 2.2: Yes.

9. If you remember, could you please tell me what were some of the things that you thought of while having the artefact in your home and soon after returning it? Do you happen to still think about these things?

P 2.2: I definitely wondered the whole time exactly why I was doing this. Just because that part was a secret to me. I made the assumption early on that this was a positive inclusion in my home. It did not feel negative at all, and my idea was that your intentions were for it to have a positive impact. There was just a lot of curiosity, but also an appreciation about my blind following of your instructions. I just went along with and enjoyed the process.

R: What about after returning it? Was there anything else that you thought of?

P 2.2: It made me think about other ways that people bring some kind of fragrance into their home. Whether that is just about making some kind of environment smell a certain way, or an intentional fragrance is brought into home, say for cleaning products, which could potentially be tied into the reason why the blue tit would be bringing different kinds of plants into its nest. Because every personal space smells different, be it positive or negative, and, why we make the choices that we make in order to fragrance these spaces?, what are we masking? if not masking, why do we choose something that is more synthetic versus something more natural, or something stronger versus something more subtle?

R: Again, do you happen to still think about these? Was there at any point between this time (previous interview) and this time, that you thought at all about these things?

P 2.2: What makes me think about these things the most is when I am at someone's home and there is a strong, often synthetic kind of fragrance. I am thinking about one person I know in particular, who uses a lot of that sort of stuff. I wouldn't say that I am particularly sensitive to it, but I notice it. And, I can taste it in the things that the person cooks, and that is very odd to notice. And, I would bet that they would have no idea, because they are so used to it. But it is something that I pick up on, and that I worry about. Or just consider the health benefits to that. So, I think it's made me notice more the kind of manufactured ways that we bring fragrance into homes, versus the natural. Because I think often, that the more subtle, natural ways, like this project for instance you don't notice it in the same way at all. Which could probably be a strength.

10. While having the artefact in your home you acquired a new behaviour, that is of interacting with an object in your home, and also the ritualistic nature of the interactions, and all the steps that were involved in the interaction. Did this behaviour extend beyond the time you

had the artefact in the home? If yes, in which way?

P 2.2: What I notice with the artefact is that I enjoyed interacting with it in that way. And, sometimes I think it is easy when you're feeling tired or whenever you are at home, to not do something that is a small act that you know will make you feel good. Like for instance, if I am relaxing I am thinking 'oh, if I really just have a cup of tea right now', and you can make yourself not get up and not get the cup of tea, or (I have a fireplace), so I am thinking 'oh, I can light a fire, I'll just do it in a bit' and then you don't do it, but you should just really get up and do those things, because it makes you feel great, right? Or, lighting a candle, or something like that. So, I think that it has made me a little more inclined to creating a sense of warmth or coziness, which isn't directly tied to fragrance, but I think that I relate those feelings to the ritual of having the artefact in my house. So, for example doing something like lighting a few candles, if I am sitting in a room, because that makes me feel calmer, even if they are not fragranced; or deciding that I am going to go get a log from the next room and put it on the fire, because that is a nice thing. So, even if they are not related to scent there is something about the act of making home, and all of those things that you can do to make yourself more comfortable in the home. And, that to me feels related to what I was experiencing with the artefact.

R: Engaging, right, and being more active?

P 2.2: Yes, engaging.

11. Could you please talk about what engaging in this type of behaviour did for you? Did it make you consider any things in particular that you haven't considered before?

P 2.2: It made me feel like I was looking after someone's really low maintenance pet. Because sometimes I would forget about it for a minute, and then I would say 'oh, my gosh the artefact! I need to be doing that! When did I last write about the artefact? I've got to do that thing'. So, there was a sense of obligation. Not necessarily negative.

R: Responsibility.

P 2.2: Yes, absolutely. To be able to care for this thing, even though it would have been okay if I ignored this. I knew I had this thing that I have to do, so making sure that I was taking care of it in that way. Being an obligation was kind of interesting because even though I look back and I see it all as a positive experience I know that there were times that I sort of forgot that I had this duty momentarily, and I had to go back and take the little papers and place them, and making sure I was keeping up to date with them all.

12. In the last nine months, did you develop or change the way you behave at home (maybe as a result of interacting with this artefact)?

P 2.2: I wouldn't say that there were any drastic changes, but I do think about the artefact. If I ever do something that involves some kind of fragrance. Like if I buy a scented candle or if I walk into my house I am hit with an odour that I did not expect, I think the artefact is kind of played in my head a little bit, at those moments for sure.

R: Could you please expand of that? How did the interaction with the artefact informed new behaviours? Because what you mentioned is more at the level of thought. I guess, what you mentioned earlier, that is being more active.

P 2.2: In terms of new behaviours, trying to make my space feel more comfortable, more active. But in terms of habits I wouldn't say there have been big changes. I think it is more about recalling how interacting with the artefact was sort of comforting, noticing how much I enjoy that and then thinking about other ways in my life that I can create those kind of comforts, which is often just doing something that helps create some sort of ambiance.

13. The interactions you engaged in were slow and required you to be rather gentle while handling the artefact. Did you continue interacting in this way with the things in your home environment?

P 2.2: I think that I am often quite gentle with things in my home environment. I think I was like that anyway.

14. During our February interview, you questioned about the role of oils and about the idea of bringing them into the home. Did any of these thoughts take any shape? If yes, what shape?

P 2.2: I do like to think about using it. I guess in ones of those habit forming and the ways I use oils in my home now, because I have a little electronic diffuser and you drop a few things in the water. So, that is nice to do, but it is also falls into that category of things that I don't always think about doing, but that I know I like doing. So, I'll think 'oh, I should activate that thing because I do really like it'. But then, that does not mean that I always do. But it is probably connected to the artefact.

R: Do essential oils play a role in your home now?

P2.2: I would use them in the diffuser for sure. I have also started using more oils in skincare in my home. I guess that too is tied into a kind of ritual. I don't think that I can draw a direct parallel to the artefact, maybe it is just more that the artefact was starting the ball rolling with more consideration, or awareness about this kind of stuff. And, then I've noticed it popping up in different ways in my life.

15. In the last months, did you pay more, less or about the same attention to dust, smells and fumes as before having the artefact in your home?

P 2.2: I am certainly aware of those things in my home, probably the same way that I was before. Because I don't think that the artefact reverse those things at all, right? But with the very small reward of the ritual of interacting with the artefact, that comfort that it would bring, can also be connected to say 'oh, I am going to wipe up the surface, because it is dusty' because there is that small amount of satisfaction that you get from doing something like that. Even though it is this kind of labour. For me anyway, and I know other people are different, you can say 'oh, I'll just do that tomorrow, or I'll do that next week'. And then it doesn't really get done in the same way, I don't have that compulsion to be cleaning things that I know a lot of people probably luckily have. So, I don't think that the artefact directly made me change my ways. At all. I think it did make me see how pleasant it can be to have this responsibility, that then makes you feel a little bit good, and that can be transferred onto other tasks that you have to do in the home.

16. If you were to describe (in detail) the experience to someone, how would you describe it?

P 2.2: I would say that the experience is a positive small act (which you do every day over time or nearly every day, with frequency over a period of time) that makes you feel calm and engaged, and mindful about taking time. Whatever you are doing, pausing and engaging with this artefact. And, it is interesting to feel that you have this obligation to this artefact, because really the artefact would be just fine if you ignore it. But, you feel like you have this need to care for it, in the way that it needs to be cared for. It is also something that you interact with every day, even if you are not actively engaging with fragrance, you look at it every day, so it is something that beautifies your home. If someone was curious about it or interested in having something like that in the house, I would recommend it, and also just describe the joy of the whole process, the unboxing of it, and how lovely the ritual can be over time.

17. In relation to your everyday life, did it change anything? Did going through this experience, bringing and having the artefact into your home, allowing you to interact with it add or change the rhythm of your everyday life?

P 2.2: It certainly did when I had it in my home, because in the back of my mind I was always thinking 'oh, is it time to interact with it'. Afterwards, I wouldn't say that there have been big changes, because I now longer have the responsibility.

R: This question is more about the time you had the artefact.

P 2.2: It was certainly on my mind. I have a number of pets that I am taking care of, and then a partner that of course is part of that whole process as well. And then we would divide the pet care responsibility. The artefact was all me. So, it was something that I thought about myself, and he was sort of curious, like 'what's this thing in our house, that you interact with?'. So, I think for that period of time, it was another thing on my list that I needed to do, but I don't mean to make it sound like a burden, because it was a lovely thing to have to do.

R: How would you describe your everyday life during that time as opposed to the time after or before, whichever time you did not have that (the artefact)?

P 2.2: Pretty similar. The artefact was hanging in my living room which is (at least in colder weather when I had the artefact), the room that I spend the most amount of time in, or at least my waking hours when I am at home. So, it wasn't so much that it changed my day to day in a big way, but I always had that awareness that it was right there. So, it was something that I would see every time I came into the house, every time I sat on the couch, and I got off the couch. Every time I walked into that room at all. It is something that I would notice. And because it is a new addition at home, I would notice it in a different way that I would notice artwork that has been hanging there for a number of years. Even though it is quite subtle and very quiet in the room, it had a different kind of prominence to me than, the other articles in my environment that feel like they blend into the space a bit more.

18. What was your favorite part of the experience?

P.2.2: I really enjoyed you delivering this box to me, which I thought it is so beautiful. The whole thing was veiled in mystery, opening it and being instructions and all of these components, and just walking into this experience not knowing anymore that you have told me (which was pretty limited) within that box. So, I really enjoyed that part because it felt like you had decided to pass this onto me, in a way that gave it a feeling of it being important and special. If you would have packaged it differently, I don't think that it would have had that

kind of effect. If you just threw it in a Sobey's bag or something it wouldn't have felt like something that I needed to care for. So, that was probably my favourite part. But I also really enjoyed the pulling off of the sewing machine stitching around the little envelopes that you created, and pulling out these paper pieces. So, the act of that actual engagement, which involved pulling off the thread, taking up the paper shape and putting it in the pocket, that was really nice. It was very quick. It didn't take long at all, but the act of that made you kind of slow down. Remembering 'oh, yes, I have that thing on my wall, I've got to take care of it, I've got to go get that little fragrance bit and put it in', that was fun.

19. What are the feelings and thoughts that it left you with?

P.2.2: It was an interesting way to further the sense of home that I feel in my home. I am lucky to have a home that I live in that feels very comfortable to me and safe. It also made me think of times in my life when I haven't had that kind of stability, and how having something that you do in those moments can make you feel calmer, if there are other things in your life that you're feeling uncertain about. SO, maybe something like this artefact being used as a way to make people feel for a moment serene and calm, in their spaces that they call home. Making something feel more homey.

20. Anything else you might want to add that we did not cover?

P.2.2: I am still full of curiosity with where this is going, but I guess it isn't my job to know these things. So, I look forward to see more of that unfold. I also wonder how I would have approached the project if I'd known about the bird beforehand, or not. Just because I like the motif of the bird, the idea of the bird, it may have made it feel even more special to me.

R: It was on the package.

P.2.2: But I don't think that I understood it in the same way. Which is also interesting because I didn't remember that either.

R: Now looking back on it I am thinking that that part of making sure that information gets to people must be much more obvious. Because there were so many things in the package that people got so involved with, so that part which was kind of simple, just a piece of text, it got overlooked.

P.2.2: I think that is a neat thing to notice, because the bird wasn't on my mind until you talked about it in the interview. I see that in my job all the time, I am emailing people information and then they don't get it, although it is literally written right there, so I'm thinking 'what's wrong with you?' But here I am doing it too. Our brains maybe jump to the stuff that we are most excited about, and all of that tactility was so exciting to me.

R 3.2 Follow-up Interview with P 2.3
Transcript [27 November 2018]

R = research student

P 2.3 = third participant from the second adoption experiment

1. R: How do you remember the experience of having the artefact in your home?

P 2.3: It was a very pleasant experience. I loved seeing it every day. It was in my bedroom, so I would see it in the morning and I would see it at night. It was a beautiful piece of art that I enjoyed.

2. R: Could you please tell me what did you take out of it? Was there anything that stuck with you after returning the artefact?

P 2.3: I actually made changes in my life. I really enjoyed not only the visual but also the sensory aspect of the project, so after I gave the piece back I went and bought some lavender oil and I started out with just having a little dish with a cotton swab and I put some lavender oil on it before I went to bed and placed it on my bedside table. That was enjoyable. So, I continued with the olfactory aspect. And, just recently I went and bought a diffuser. So, I started using that.

3. R: Do you find it had meaning that experience, apart from the practical aspect of introducing essential oils in your home and buying the diffuser? Did it affect you in any other way?

P 2.3: It reinforces the need to take the time to relax, to calm down and have a quiet time at some point in your day. For me it would be in the evening.

4. R: Are there any things you would change about this experience? Was there anything that you would have wanted to be different?

P 2.3: I think I mentioned this in the first interview. I felt the smell dissipated very quickly, so it would be nice if it were stronger or if the participant could replenish the oil. So, if a little bottle with oil was put in the kit and if people wanted to, they could just add more drops.

5. R: How do you remember the artefact? Can you talk about how it looked and what it did?

P 2.3: It is very beautiful. The design is taken from the natural environment, so it has flowery shapes. Very organic. Floating shapes. I was reminded of jellyfish, very smooth, calming, soothing imagery. The colours too, are natural browns and greens. Very soft colours.

R: What about its function in the home? What it is that you were doing with it?

P 2.3: I would unravel some of the piece that would then reveal the scent.

R: I actually have it here, so you can have another look at it.

P 2.3: Yes, here are the pieces that I unraveled and attached. So, you replenished these?

R: Yes

P 2.3: Yes, I unraveled and then I would find my shape and then I would tie it on.

6. R: Do you remember what the artefact was about? If yes, could you please tell me?

P 2.3: Yes, it was about the little bird, the blue tit. It is a little bird who collects aromatic herbs from its environment to put in its nest to make it fresh and clean. It would be interesting to know. Is it always doing it, or is doing it for its babies?

R: It's doing it every time is building its nest, so when they are nestling and laying eggs.

P 2.3: So, they would do it before? So first they get everything ready and then lay the eggs, and then the little ones hatch, and they have this beautiful environment.

7. R: The artefact was inspired by the nest behaviour of the blue tit female bird that was placing aromatic plants in its nest (as a way to keep their environment healthy). In a similar way, you had to place on/remove from a panel in your home fragments infused with essential oils.

P 2.3: So, where is the male?

R: I don't know. Good question.

P 2.3: It's not part of it.

R: No, it is not. It is clearly stated that the female bird does that. What did it mean to you the fact that you were engaged in a behaviour similar to the bird behaviour?

P 2.3: It made me feel more a part of nature. To mimic this tiny little being, and we were both trying to keep our home nice and friendly and healthy.

8. R: Do you think about this (i.e., the fact that you were engaged in a behaviour replicating the bird behaviour)? Obviously, you remember it well. I am surprised because it has been nine months and you did not have this (the artefact), but do you still think about this?

P 2.3: Yes. Because I started using the oils. So, I think about it in that terms 'so glad I did this!', so I really enjoy it. Also, because I have a weaving hanging where I had this piece that is similar in colour, sometimes I think back when I look at it.

9. R: If you remember, could you please tell me what were some of the things that you thought of while having the artefact in your home and soon after returning it?

P 2.3: The issue of pollution in the home came up and how to purify it. How to kind of rather than getting rid of chemicals not even start having chemicals in your home. So, using more environmentally friendly products to clean. If at all, I just use baking soda. Also, I think I was very grateful, because I thought about where I live, in nature, out in the country, so I feel grateful for that, compared to let's say living in downtown New York where you are just bombarded with all the noise and traffic, pollution.

10. R: While having the artefact in your home you acquired a new behaviour, of interacting with an object in your home. Did this behaviour extend beyond the time you had the artefact in the home? If yes, in which way?

P 2.3: I don't think so. Because I am a maker, I make my own craft or art, so I am always interacting with materials, but I haven't in the olfactory sense. I value keeping my hands busy or weaving in particular it is such a good way to calm down and to meditate. And, I guess I am lucky that I can incorporate it into my daily life.

R: Did you want to say something else?

P 2.3: Yes, the importance of working with your hands and how important that is to your wellbeing.

11. R: Could you please talk about what engaging in this type of behaviour did for you? Did it make you consider any things in particular that you haven't considered before?

P 2.3: Keeping things simple. Just thinking about the bird. Just having this one little nest that is your home and making sure that is okay. Just try to get rid of all the clutter in your life. And that could be dirt and dust. Making sure it is always clean, and that you have a healthy environment. But also, kind of visual clutter. And, take time to create this space that is calm and keeps you grounded.

12. R: In the last nine months, did you develop or changed the way you behave at home? You said you introduced in your home the oils, so that was something new that you did.

P 2.3: I think I've become more sensitive to being aware of a healthy environment. Not just in my home, but also at work. And, if I am out and about.

13. R: The interactions you engaged in were slow and required one to be rather gentle while handling the artefact. Did you continue interacting in this way with the things in your home environment?

P 2.3: Because of the nature of being it textiles, I have always been like this, working with fine threads.

14. R: During our February interview, you questioned about the role of oils and about the idea of bringing oils/ plants in your home as a way to replicate the bird behaviour. Did any of those thoughts take any shape? If yes, what shape?

P 2.3: Yes, I bought a diffuser.

15. R: Do essential oils/aromatic plants play a role in your home now? If yes, what is the role?

P 2.3: Yes. And, not only lavender oil. I also bought something that is called a smoke eater. It was designed for people who smoke at home, to get rid of the horrible smoke smell.

The apartment in Dartmouth has these old wooden rafters, so I bought some of the smoke eater, because this old wood kind of gives off strong scents. And that is patchouli and lemon. So, I bought the spray and I sprayed that.

It is really helping because around a door frame (it's an old house) we discovered an ant nest. So, when we took it out, we vacuumed, cleaned and I've been spraying the cavity with the essential oils spray. And, it works.

R: So, it is only essential oils?

P 2.3: Yes, it is just with water, and it comes in a spray bottle.

R: So, it is also for ants?

P 2.3: No, it's just the smoke eater, but I think the patchouli has antibacterial properties. So, I have the diffuser, the spray and just the oil. I got the lavender, but I also have the geranium, grapefruit and bergamot, which is awesome.

R: Is this for the diffuser?

P 2.3: Yes. It is really refreshing.

R: So, they are not mixed, they are different ones, right?

P 2.3: No, it is a mix. They use a geranium base and grapefruit and bergamot. But they don't tell you the proportions. They're secret.

16. R: In the last months, did you pay more, less or about the same attention to dust, smells and

fumes as before having the artefact in your home? Why do you think is that?

P 2.3: Definitely more. Well, it is kind of like getting hooked to this lavender smell. It is so soothing that you just want to be around this nice environment all the time. I should get a diffuser for my office.

R: Yes.

P 2.3: Actually, there is a diffuser store here in town. They also have these cool plants, hanging down, upside down, in these special pots.

17. R: If you were to describe (in detail) the experience to someone, how would you describe it?

P 2.3: I remember I was very excited to be part of the project and really wonderful was the beginning because the packaging was so beautifully done. And it felt like this delicate treasure that you had entrusted to my care. So, it was just really fun and exciting to open it, because everything was so meticulous you had to be very careful with it. Everything was so delicate and there was this story about the bird on the card, so you slowly got into the project. And, then opening up the beautiful panel and then you had to find a place to hang it, and install it. Then opening these little things were wonderful moments, when you unravel it, take it out and you are wafting the beautiful scent and then attaching it to the panel and just enjoying it every day. Because it was in my bedroom I enjoyed it in the morning and in the evening looking at it.

18. R: In relation to your everyday life, did it change anything, did it add something?

P 2.3: Yes, because every day you just took a moment or two to immerse yourself in the piece.

19. What was your favorite part of the experience?

P 2.3: Discovering the scent.

20. What are the feelings/ thoughts it left you with?

P 2.3: It made me feel good about my home, about living out in nature. It made me feel good thinking about the little bird.

21. In relation to your everyday life at home, having the artefact and interacting with it disrupted the rhythm of your everyday life at home. What was the impact of this disruptions? Did they trigger any thoughts/actions? You said it was pleasant and that you enjoyed that.

P 2.3: The importance of seeing the little things in life. Paying attention to simple things. Being more mindful.

R: I know you did not have the artefact in your home for nine months, only two weeks, so this is more like guessing, but do you think the experience would be the same if you were to have it permanently in your home? Let's assume there was a way to replenish the oils, because I know this was the issue last time, the fact that they evaporated and there was nothing to do with them after that.

P 2.3: Yes, I would continue with it. For sure. It is almost like an advent calendar. Like a ritual you do every day. So, if you had a little bottle so that you can actually add more and then put it back up on a weekly basis, just like I go around and water all my plants. Then I go and I sniff and add more oils to the pieces that are evaporated.

R: So, how would doing that make you feel?

P 2.3: Taking care of my home, and of your environment.

R: And of yourself?

P 2.3: Yes, of myself.

R. 3.3 Follow-up Interview with P 2.4
Transcript [29 November 2018]

R = research student

P 2.4 = fourth participant from the second adoption experiment

1. R: How do you remember the experience of having the artefact in your home?

P 2.4: I remember it as a very beneficial experience, a very positive one. I think about it pretty often. I engage with the space that I live in quite a bit. I've been thinking about putting up more artwork in my space and more textiles. And, also the role of nesting and how nesting in your own home affects your health and wellbeing. I think having your artwork in my home was very positive, was good for my health to engage with the work and the different layers, the oils, the paper, the actual actions of undoing the crochets. It was nice to engage with an object like that.

2. R: Could you please tell me what did you take out of it? Was there anything that stuck with you after returning the artefact?

P 2.4: Before I had your work in my home I haven't really thought about having artworks that I would engage with on a daily basis. I have artwork but it is kind of passive and I don't really think about it a lot. You buy it and enjoy it, but on a day to day basis, life and things are in the way and some things become invisible in your space, whereas your work it was not something that was. Because I had to engage with it every day. I would like to have something in my home that is like that, again. That is, open to touch and to engaging with it on levels that are more than visual.

3. R: Do you find the experience had meaning? Did it have an impact on anything apart from what you were mentioning? Was there anything else about this that carried on since?

P 2.4: After that I think more about how I interact with the space I live in, and how I interact with the objects in my home. And, also how my different sensory perception of things, like having natural oils around is nice. That is something that I did not think about before, but I do enjoy it. And, also the cleanliness factor, and nesting habits. Thinking about my own nest. I like to keep a clean home. Tidy, most of the time. The experience of having your work in my home was positive. That whole two weeks I paid a lot of attention to everything around me. I tried to keep it very clean, so I think that definitely carried on.

4. R: Are there any things you would change about this experience? Was there anything that you would have wanted to be different?

P 2.4: I don't think so. It was a good experience. I really enjoyed it and I honestly think it had positive effects. So, I can't really ask for more than that.

5. R: How do you remember the artefact? Can you talk about how it looked and what it did?

P 2.4: I can't remember if it was only mine or if there were different ones that had the same theme, but mine was about the blue tit. It was based on that bird's nesting habits. It was a rectangular piece of linen with infused paper that was crochet on in very beautiful shapes and colours. I remember undoing the crochets. When the paper would fall off it would reveal new colours, and new scents. Also, the strings themselves were different colours and having them pile up was very lovely too. The thought that went into every little bit of the work was very lovely.

R: I actually have it.

P 2.4: Lovely!

R: One is intact. Oh, no, I re-did that one because I had to show how it looked with them on to the exam that I had.

P 2.4: Yes, I took them all off.

R: So yes, you remember it well. It had the crochet.

P 2.4: Yes, I remember that. Did you put this? Is this the original?

R: Yes, I put it back on.

P 2.6: It looks brand new. Very good. It's beautiful. The amount of detail you put into each leaf.

R: I am very glad you liked it.

6. R: Do you remember what the artefact was about? If yes, could you please tell me? You talked about the interactions, how it looked and you also mentioned the bird. So, can you talk a little bit more about that?

P 2.4: It was about replicating blue tit's nesting habits. The bird collects bits of lavender or different plants that are infused with different oils to steer off bacteria.

7. R: The artefact was inspired by the nest behaviour of the blue tit female bird that was placing

aromatic plants in its nest (as a way to keep their environment healthy). In a similar way, you had to remove from a panel in your home fragments infused with essential oils. What did it mean to you the act that you were engaged in (that is, replicating a behaviour similar to the bird behaviour)?

P 2.4: I thought it was really interesting. I think as humans we can learn a lot from animals, and how they interact with the natural world, so having the chance to kind of replicate that process in a scalable form for a human being is cool.

R: Did it trigger any sort of thought?

P 2.4: It made me think about my own home environment, but also more broadly it made me think more about what we can actually learn from animals and how they live and what we can learn from that as humans.

8. R: Have you thought about this at all, between the time you returned the artefact and now? Did you continue thinking about that at all? Do you still think about this (i.e., the fact that you were engaged in a behaviour replicating the bird behaviour)?

P 2.4: Yes.

9. R: If you remember, could you please tell me what were some of the things that you thought of while having the artefact in your home and soon after returning it? Do you happen to still think about these things?

P 2.4: I still remember it pretty well. I remember thinking a lot about it because I had it placed in a lot of different places and primarily it was in one spot directly across from my bed, hanging from a beam. It was really cool to see how light interacted with it in different parts of the day and how it would look. And, also to be able to see the work from two sides because the back side of it also looked out to my living room, so it made me think a lot about light in my home. I had this in my home shortly after I have moved here, and before I lived in that apartment, I have been living in Toronto in a basement apartment for a very long time. It also made me appreciate my space more, because let's say if I had had this work in my previous home, I wouldn't be the same experience. Probably not as enjoyable. It would have still been lovely but the way the light hits it in a very nice space, makes a difference. Although having this on any wall would be lovely.

R: I know, but I get what you are saying. Because of the transparent nature of the background, if you use light when you display it you can heighten its qualities, and it can change the way it looks. So, I think that's what it did for you because you had so much light. It has a see-through quality because it is a transparent fabric, so then if you just put it flat on the wall you don't get that all.

P 2.4: Yes. And, I think I did have it against the wall at one point. Briefly. But, it is just very beautiful and the light can go through it, so it made me really appreciate my space, and especially after having lived in a basement apartment for so long. It was cool, and made me appreciate my surroundings. I also think that having this work in my home I may want to pursue having in my home things that interact in my home in a similar fashion. So, in my future homes light is very important to me, I think it is good for our wellbeing, so I think this really stressed out that too.

10. R: While having the artefact in your home you acquired a new behaviour, that is of interacting with an object in your home. Did this behaviour extend beyond the time you had the artefact in the home? If yes, in which way?

P 2.4: I would say yes. Obviously in different ways. I bought more art shortly after I had this in my home. It made me think 'oh, I should make this place nice looking', because having this was really nice. And then, in terms of nesting habits I think that regularly cleaning my apartment. I've always been a pretty clean person. But I guess that now I notice a lot things that fall on the ground.

R: Because of the nature of the petals falling?

P 2.4: Yes, and the little strings, how they built up. I have a lot of hair and it gets everywhere, so when I sweep the floor I find piles of hair, which are clearly not enjoyable to clean up. The shapes of the strings are similar but hair is gross. What kind of things can I have in my home, that when they fall on the floor are nice, and, improve the little dust? once they get infused with everything else that is in your life. What can you add to that to make it a less gross space? I don't know if that makes any sense.

R: I think It does.

P 2.4: I think a little bit more (aware) of how things built up in my home. I would definitely say this came out of this. Like, things that pile up on the floor. If your home is full of things like these (petals/ leaves) once they fall and you're cleaning up, that's a healthier thing to pick up than dirty dust and hair. Although I can't control that.

11. R: Could you please talk about what it did for you to engage in this type of action? Did it

make you consider any thing in particular that you haven't considered before? One of them was what you were saying, that is paying more attention to things piling up.

P 2.4: Yes, I would definitely say I pay more attention to things piling up, like dust and hair and just generally keeping the floor clean. And, having nice smelling things like natural oils. Things that aren't chemical. That are made beautiful in natural ways not through chemical cleaners, or that improve the space through chemical interaction. I try to but natural cleaners. I don't usually use chemicals in my home generally.

12. R: In the last nine months, did you develop or change the way you behave at home maybe as a result of interacting with this piece?

P 2.4: I guess I've already talked about piles of dust and stuff. And, I guess buying more artwork to put in my home. And thinking about the different types of artwork that I have in my home too. This was very interesting to have. I hadn't had something like this in my home before. I purchased a couple of embroideries. Having different textures and colours. Having something like this in home it made me think 'okay, I should have things in home that maybe when I look at them it might not be the first thing I think of to put up, but it can have very beneficial results'. Step outside of your usual zone of aesthetics, comfort zone.

13. R: The interactions you engaged in were slow and required you to be rather gentle while handling the artefact. Did you continue interacting in this way with the things in your home environment?

P 2.4: I am pretty gentle with everything. I think this did played a part in that. I am not generally an aggressive person. I take care in how I move things, and I don't handle things aggressively. I think I was like that before also. There were certain objects that before this I would automatically approach very gently or carefully. I am a flute player, so I am very careful how I touch my flute, and where I keep it and where it sits in my home. At all times, it sits on a dresser by my bed. It is always within eyesight. And that's always how I've been with it. Ever since I was a kid. That is how I am. That is the most important object to me for many reasons. I would say that prior to having this in my home I wouldn't say that I roughly handled lots of other things in my home, but I would not think about it. I would say that now I do think about how I handle certain things. Like the textiles in my home, or how I clean. I don't aggressively clean (like scrubbing things until the finish wears off or something), I am generally more gentle or mindful of how I approach objects.

14. R: During our February interview, you questioned about the idea of bringing plants in your home (as a way to replicate the bird behaviour). Did any of these thoughts take any shape? If yes, what shape?

P 2.4: Yes. That is one thing I did. I do have a few plants in my house right now that are going wild. I let them run free. I have one viney plant that is pretty big now it started off as a little plant, a cut off of another plant. And, it kind of morphed into two plants. It is really cool to have in the house. It is really interesting to see because it also interacts with light in funny ways. It sits on the middle of my kitchen island, but directly above it there is a skylight, and when it's particularly sunny all of the vines shoot straight up. It is a funny thing that interacts with the space. Because it can sense the sun coming from above it. But when it is not sunny out, it just crawls around. So, yes, since I had this in my home I did get some plants.

15. R: Do essential oils play a role in your home now? If yes, what is the role?

P 2.4: Yes. And, in some funny ways. I think I've told you that I have mice in my house in the summer/early fall, and I had some traps put but I also did some reading on oils and how they deter mice, and it turns out peppermint oil deters rodents, so I sprinkled that everywhere. I think it might have worked a little bit. I stopped seeing them. It might have been the oils, or the traps everywhere too. I caught a couple but then I stopped catching them but they didn't come back. Also, I try to buy stuff (like bubble baths) with natural oils for beauty of my own self-care.

R: What about cleaners?

P 2.4: I bought some lavender scented natural cleaners. I don't think that they are infused with lavender oil. And, peppermint too. Yes, I bought some lavender cleaners that are natural. I'm not sure how true it is. I am always skeptical about cleaning products. If it says 100% natural. I don't think it had lavender oil, but maybe it did.

16. R: In the last months, did you pay more, less or about the same attention to dust, smells and fumes as before having the artefact in your home?

P 2.4: Definitely more attention, for sure.

R: Can you expand on that?

P 2.4: I definitely try to dust my home more often, and I know I have talked about how I don't like having stuff piling up on the floor, like hair and dust, and gross stuff like that. I take notice of that a lot more now.

17. R: If you were to describe (in detail) the experience to someone, how would you describe it?

P 2.4: it was a very beneficial experience. I think it can have a positive impact on people's home life and their own personal nesting habits. I think it is really interesting to think about nesting habits in general. There is something you think about with animals but we do the same things in our own homes. Home is a very important place. It is the most important place in people's lives. I guess I spend a lot of time at work, but, home is your space, what you create for yourself. It's nobody else's. I guess other people cohabit with other people, but I don't, so it's my own space. This was very interesting because it made me think about my own space and how I interact with it, and how I want to see my own space evolve, and my own place in it as well. Because, interacting with objects like these, makes you think about your own place in the cycle of being. My actions have consequences on the things around me and I think that is a big lesson to learn. So, I think this can be beneficial for many people, if not most or all.

18. R: In relation to your everyday life, did it change anything? Going through this experience, brining and having this into your home, allowing you to interact with it, did it change/ add anything to the rhythm of your everyday life?

P 2.4: I guess I have already talked about nesting habits and how I interact with objects, just generally not even in my home, but outside of my home too, let's say my office, for example how that space is set up, the type of things I keep in it. I recently really cleaned up my own office space, I just can't stand the dust in there, and how things pile up. So, I think it is really important to think about things like that even outside the home. But, definitely within my own home a tone, but also outside of that too.

R: Do you think it created some sort of new rhythm? New habits? For two weeks you engaged with it either physically, by unravelling or just looking at it, so if you were again to look back on that experience. What that engagement brought to your everyday experience?

P 2.4: The engagement has carried over. Especially the journaling aspect of this experience was pretty interesting because having to write down your thoughts and experiences with engaging with the work. I think more mindfully about my actions at home, quite a bit more. I don't write down all the actions I have with all the objects in my home, but I definitely do think about how I touch things and I am more mindful about dust and stuff. I think about that quite a bit now. I dust quite often now. When we interact with things in our home it is in a time and space just like anything else in our life. Those interactions we have with objects in our home are pretty significant because we spent a lot of time there and it is having the chance to really think about how I was interacting daily with this one very beautiful object. That carries over to other things in my home. And within my other spaces in life.

19. R: What was your favorite part of the experience?

P 2.4: I really loved taking off the crochets and seeing what was underneath it.

20. R: What are the feelings/ thoughts it left you with?

P 2.4: I guess calmness. This work is very calming to look at. I find all these colours, the purples the pinks and the linen, how its dyed is very calming to look at. So, having this in my space was very calming. It was very beautiful. The whole concept of the work, the actions and the role that the audience member or the person interacting with it has its life, it's very cool. Sometimes you interact with artworks in galleries, or performance stuff but those are not generally within your home. You are at a gallery or at a performance space or on the street. Although this was not a performance, this was real life, interacting with something in your own space. That is also another interesting thing I got out of this. Sometime when you interact with art is part of a performance, whereas this is, I want to say an authentic experience, but I feel authentic is always a word that is thrown around by so many, and it can mean so many different things. So, I am not sure it really applies to this. But this was action-based in a very real way. Performance is not authentic, right?

R: It's staged.

P 2.4: Yes, it's generally staged in some kind of way. And, having this in my home it's just me and the work, there was no pressure to have it any certain way or have it project out to somebody else in a certain way. It was just me, the work and my own personal interaction with it. And that was it. That was really cool.

21. R: Is there anything else you might want to add?

P 2.4: If I am being asked to personally take part in a work of art, there is usually some kind of performance aspect to it, and this was not that. This was something different.

R: It was interactive.

P 2.4: It was interactive, but it is not a performance. My role as an audience...

R: That's the thing you are not the audience with this.

P 2.4: No, you're not the audience with this. I am also not the creator.

R: You're the participant.

P 2.4: Yes, the participant.

R: But you are not being told what to do. You are just being given this (the artefact) and the freedom to interact.

P 2.4: There isn't really an expectation. It is really cool.

R 3.4 Follow-up Interview with P 2.5
Transcript [4 December 2018]

R = research student

P 2.5 = fifth participant from the second adoption experiment

1. R: How do you remember the experience of having the artefact in your home?

P 2.5: I remember that: number 1 it filled the space on my wall and made a whole area of my home much more beautiful. And, I also (probably my memories are mainly tactile), definitely enjoyed handling the piece, and interacting with it. I also feel that the colour scheme has been unconsciously integrated into my home now, a little bit. I wasn't expecting that but it is quite nice. Until I get tired of those colours I'll probably keep them. Definitely, into my artwork as well, the whole concept of layering that I spoke of last time. I have always thought of as philosophy and ideas being layered, but I never really unconsciously realized how drawn I am to layers in the physical form, and after experiencing that experiment I was much more conscious of that. And, I incorporated it quite heavily into my own work and I still do. As a child and as a younger person I did layered things but again it was unconsciously, and I became conscious after that. Very interesting.

R: So, if you were to give a description to how the experience was, how would you sum it up?

P 2.5: I would describe it as different. People don't generally ask you to interact with objects in those ways. So, that was new to me. And, much more intimate that I am used to. Especially in North America where we are thought to throw things away all the time. I felt I had more compassion for the piece and compassion for inanimate objects in general, which maybe I wouldn't have really thought about before. So, the experience was much more intimate than I would have guessed, even though I know it is kind of data driven for you. For me it felt very personal.

R: Why compassionate?

P 2.5: I think part of it had to do with the fact that the backing of it, the substrate was very delicate. I felt I had to take more care with it. Just instinctively, and maybe was just part of it. But, just when you are handling something, especially that has little thread that you have to pull, it felt quite delicate. So, my natural reaction was to care for something delicate, just as a human. I guess that came up when I was interacting with it. It felt quite natural at the time, but it is definitely a much different experience that we are really taught to have with objects that we bring home. Especially things like furniture of interior design pie or just even something that you bring home to put on your wall, which you take home, put on your wall and never touch it again. Just look at it, and take it down when you hate it. And, I don't think nearly as much thought goes into anything in that kind of timeline.

2. Could you please tell me what did you take out of it? Was there anything that stuck with you after returning the artefact?

P 2.5: Definitely the idea of layering in the physical space. Even in my bookbinding I use that quite a bit, every single day and my sewing and textile projects and my sewing even I plan to do some layered pieces in my photography class. I already did some in my previous one, and I plan to do more in the other ones. That made its way into my work. Both consciously and unconsciously, I think. And, that's been wonderful. I also pay much more attention to what I bring into my home, specifically with respect to 'do I like the way it feels into my hands?' And, I actually got rid of a lot of things that I was using and that were necessary in my home, but that I didn't like the feel of. So, I am now in the process of replacing all of those things. It's a little bit more expensive, but I realize that how much more comfortable by home life is, because I have taken the time to respond to that tactile feedback and say 'ok, I really don't like the way this shirt feels, I don't want to wear it, I shouldn't be wearing it' If I don't like the way it feels I'm going to get rid of it. So, that's been another thing. And, as I said the colours seem to have stayed in my home. Certain things that I have gotten or changed are in the similar colour scheme. I found them quite calming and I think that is why they stayed.

3. Do you find the experience had meaning? Did it have an impact in any other way apart from what you just mentioned?

P 2.5: I would say philosophically it does. Again, I remember years ago arguing in theory class about how philosophy and ideas have layers and that you can't just put them in boxes, it's too simplistic. And, I was arguing this for years, so this kind of brought that up and it also helped me to develop that feeling a little more. I think about it more in relation to my physical experiences now. And so, it helped me philosophically to mature my ideas, bring them into the physical space as well as to the abstract thought area.

R: How did you bring them into the physical space?

P 2.5: Probably my art practice is the best example. Just as I am working with materials and layering them using my hands, and my techniques, I am also think about how they might relate metaphorically to something that is happening in my life, or something that is happening in the world, or the ways existence is woven together. I don't know how it happens really that understanding and physical work (handling things and layering them with my hands) and changes are linked, but I feel they are somehow. So, I guess that is open for investigation.

4. Are there any things you would change about this experience? Was there anything that you would have wanted to be different?

P 2.5: I might have wanted it to be a bit longer. My experience with the piece. And also (I think I might have told you last time) I might have put it in a different place. I thought that my desk, even though for the most part I try to keep it clear, I would let's say put a pile of books out there and some days my desk would become a barrier. If I were to do it again, I would make sure to put it in a space where I could directly approach it. Where there wouldn't be anything in between. Even just symbolically if the desk was there, was a barrier, even though I was sitting at it for the most part. It was still there, physically in between me and the piece. I also thought it might be interesting to take the piece a second time and see if responses have changed or even just put it in a different room, or doing the second time with the same artefact but change something about it. I think that might be interesting too.

R: Even if you change the time, right? You might keep everything the same but you have an expectation and you have a different understanding of it, so then that will impact how you perceive it the second time.

P 2.5: Yes, for sure.

5. How do you remember the artefact? Can you talk about how it looked and what it did?

P 2.5: The artefact (I don't remember the exact dimensions of course), had wooden dowels. I think it had one at the bottom too. The main material was this see-through gauzy material that had a botanical print on it. And, on the botanical print in the spaces of flowers and leaves there were little sandwiched of materials stitched on. And there was a felt layer on the bottom, and then underneath there was a thicker paper that was saturated with the essential oil, which was either peppermint or lavender. And, on top of that I think there was another piece of paper. And, they were stitched on together with colour thread. I think there was felt on top, and it was stitched around in a running stitch, juts the basic contours, and then the top of that was crocheted a net, and then you pulled the string, and the net would unravel. And it was hung by a string.

R: I have it. And, yes that was exactly how it was.

6. Do you remember what the artefact was about? If yes, could you please tell me?

P 2.5: I do remember it was about the nesting behaviour. I don't remember the name of the bird now, blue something I think.

R: Yes, the blue tit

P 2.5: The blue tit, yes. And it was about how overtime they would bring materials to make their nest and take it away. And, kind of refurbish their little nest overtime. Also, how they would bring certain types of things to make their nest with. I don't really remember the rest. My memory is much more visual.

7. The artefact was inspired by the nest behaviour of the blue tit female bird that was placing aromatic plants in its nest (as a way to keep their environment healthy). In a similar way, you had to remove from a panel in your home fragments infused with essential oils. What did it mean to you the act that you were engaged in (that is, replicating a behaviour similar to the bird behaviour)?

P 2.5: Just the idea of engagement had a lot of meaning for me. I did notice that the essential oils were not as strong as I was anticipating. It could be that my home is very warm, maybe they evaporated faster. So, I didn't really get the scent experience that I had been expecting. Other than that, I did because I read about the nesting behaviour when I opened the package was on my mind when I was doing this. Also, nests are often made of botanical materials so it was a visual connection when looking at the piece as well. And, the fact that the piece was in my home. We describe homemaking as nesting, we use the word in popular culture, when you are making your home all cozy you are nesting, so there is a human parallel to that for sure. For me the meaning was the engagement itself and what that brought up and entailed.

R: What did the engagement bring up and entail?

P 2.5: It just brought up all those ideas about layering in space, versus layering of ideas. It brought up what do I bring into my home? And what can I do to be more conscious of each thing I bring in? It is going to benefit me? Is it not? Do I actually enjoy this thing that I am bringing into my home and if not why am I doing it? What are the reasons? And maybe if I hadn't, wouldn't that be better. And, also

adding things. Maybe there is something that is absent that I should bring in because of the benefits involved. So, it was more philosophical for me.

8. Do you think about this (i.e., the fact that you were engaged in a behaviour replicating the bird behaviour)?

P 2.5: I do occasionally I kept wanting to make something to put in that space because I did like the dimensions of this and how it sat in that little nook where I have my desk. So yes, I do occasionally think about it, 'oh, yes, I should make something, a tapestry to go in there but I haven't really made anything that could ideally go in there. And, I haven't really settle on something. Like, okay I have this idea and it is going to go in this place'. So, if I make something in class that's that shape and size it would probably go in that area. Depending on whether or not I like it, But, yes I do occasionally. I look at that empty space and I think 'I wonder what I should put there? I remember that piece'.

R: Do you ever think about this parallel between the bird behaviour and what you were asked to do?

P 2.5: I think so, but I don't think that the idea of the specific bird makes it into my mind so much. It is much more abstract than that. Just again, the idea of bringing and taking away. There are plenty of birds outside my window all the time. In this one tree, they seem to congregate all different kinds. And, I do observe birds quite often in my hikes and things like that. But I do not specifically think of this bird. Mainly because probably because I don't see it. Maybe if I would see it on my walks I would connect it with this. So, it is more general.

9. If you remember, could you please tell me what were some of the things that you thought of while having the artefact in your home and soon after returning it? Do you happen to still think about these things?

P 2.5: I remember thinking about taking away versus adding things to a piece. I remember thinking how curious it was that the substrate was so delicate. Because when we think about furniture and home things, we think about the fact that it must be strong. So, I felt that was quite a turnaround from what I was used to. And, I remember really noticing the sound, as I pulled it. The sounds as it pulled out of the paper and the vibrations that came from pulling the thread net apart. I remember some of the piece became nodded, and I actually sat there and undid the knots. There were a couple that I had to cut because I couldn't do it, but for the most part I would sit and undo them. I was quite happy to do that. I am a weird person, and I like untangling things, but also it felt quite natural to make that decision. I remember thinking that I enjoyed the colour scheme that you had there, and I remember really enjoying the sandwiching of different materials together. And that was partly why I didn't unravel the rest, because I really loved them the way they were, they were just so compelling. So, yes, and I do remember unexpectedly not smelling the oils as much as I wanted to. I did want to smell them, so I was expecting to smell them more than I did. I definitely remember that the piece really completed that little nook that I had for my desk. Something on the wall was the one thing that was probably missing from that area. And, those dimensions worked very well. I also remember that it was very visible from my bed and that I was able to look at it. So, it spent quite a lot of time in my visual space. So, that gave me a lot of time to think. Both, consciously, and, that it was in my space and my brain was processing it, or being actively thinking about it.

R: Do you still happen to think about this?

P 2.5: Yes, I occasionally do.

10. While having the artefact in your home you acquired a new behaviour, that is of interacting with an object in your home. Did this behaviour extend beyond the time you had the artefact in the home? If yes, in which way?

P 2.5: I think it did. I have been making things for the home now. I mean I did it when I was younger and we lived in the country, but since moving to the city I haven't really done that. I started doing that again. And, even when I use and hold things like my dishes, I am actually feeling them in my hands. I do think I interact with even just my furniture and my things I have in the home, like linens and everything. I think I spend a little more time handling them than I did before. I only put one thing on the wall which was kind of a tapestry I did a while ago, but I have plans for things that I would like to do. My walls are really bare. I don't have anything on them. Except for that one textile piece. But I have plans for tapestries that I would like to make. My mom used to do tapestry when I was a girl, I think that is one of the reasons that I like this. She used to do them with recycled fabrics. She would find a painting she liked and she would recreate it in fabric. So, I wanted to do things like that with fabric and embroidery and photo. So, I have plans for things to go on the wall. I don't know if there are going to be interactive or not. I will have to consider that. That is the thing, if you are building an artwork, something that will be displayed in the gallery, how do you...? Most of my work is tactile, that is the main feature of everything I do, whether is bookbinding or even photo. The main thing I try to convey is how does a thing feel to touch it? Even though I'm just showing it to you. So, coming up with ways in which people, visitors to your piece can actively engaged

with it without destroying it, or could that destruction be a feature of the art? So, it is not just the home, I definitely spend a lot of time thinking about it as an artist, because it is coming out very clear that my work is really inherently tactile. So, I have got to solve this problem. And this is giving me a few ideas.

11. Could you please talk about what engaging in this type of behaviour did for you? Did it make you consider any things in particular that you haven't considered before?

P 2.5: Consciously (as this wasn't something I was conscious before) the sound of materials, when they are moving. When you are touching them. And, when you are interacting with them. They make sounds, and even if those sounds are very, very tiny or brief, they are there and noticing them consciously just brings a whole new dimension to the interaction. Our world is very, very noisy, far too noisy and I have a very hard time filtering all that noise, it fills your brain up. But when is quiet and you have brain space for things like that (say in the gallery or in your home) it's a whole new dimension that we don't normally have the space or even just the silence to engage with. I think that was the main one.

12. In the last nine months, did you develop or change the way you behave at home (maybe as a result of interacting with this piece)?

P 2.5: As I said, I have been handling my surroundings more consciously than before for longer periods of time, than I had before. I collect handmade pottery, most of my dishes are handmade and I don't have a whole lot of dishes, but the ones I have, I made a point to say 'this is beautiful, I love this! I love the way it feels, and I want it in my home', so, when I'm having my coffee in the morning I am handling this thing. I spend more time handling my pieces even if it is just my bed as I am making it, or my tables as I am cleaning them, or curtains as I am drawing them closed. I am actually taking the time to feel a little more. Just being conscious of that nexus of touch.

13. The interactions you engaged in were slow and required you to be rather gentle while handling the artefact. Did you continue interacting in this way with the things in your home environment?

P 2.5: I would say yes. I've also increased the amount of handwork that I've done with delicate stitching. I am doing a lot more things like embroidery now than I used to. Again, a lot of this stuff I did as a child and I stopped when I grew up, so revisiting that was really nice. And, what I have been doing, that is making more things for the home and incorporating delicate techniques. And, into my bookbinding too. That can require a lot of delicacy. I have always been quite delicate with my handwork, anyway, so this just enhanced it. I think for the most part it is bringing it to the conscious front. That has helped. It is something that I have always done to varying degrees, but bringing it to the conscious level and realize and think about what I am doing, that's a little bit new.

14. During our February interview, you questioned about the role of oils and about the idea of bringing oils/ plants in your home (as a way to replicate bird behaviour). Did any of these thoughts take any shape? If so, what shape? Do essential oils/ plants play a role in your home now? If yes, what is the role?

P 2.5: Yes, they do. I have always used them for cleaning. I use things like lemon juice, baking soda, essential oils, tea tree oil I used quite a bit for disinfecting. Lavender oil if I notice anything mouldy. Lavender oil is always my go-to because it kills mould wonderfully. Also, I have an aromatic diffuser, so I use essential oils in that one too.

R: Did you always have that?

P 2.5: It was given to me as a gift for Christmas last year. So, it was good timing. I use that and also just if I am burning a candle I might put a drop of essential oil in there too. Yes, scent is nice, especially in the winter months when your windows cannot be as open as you like. You don't want to come home and smell the stale air. It is nice to have a scent component to your home, to what your home feels like. Peppermint is one of my favorites, lavender, tea tree, sometimes I combine them. Rosemary is also one that I use a lot, and grapefruit.

15. In the last months, did you pay more, less or about the same attention to dust, smells and fumes as before having the artefact in your home?

P 2.5: I would say more. Partially because I am dealing with some sensory overload right now, and I really need to watch what I expose myself to. Dust, yes. I need to dust like crazy. I have realized (maybe as a response to this, but I don't know) that my apartment is the dustiest home I've ever lived in.

R: Maybe because we live in the city.

P 2.5: Yes, but I lived in other places in the city that aren't so dusty, so I don't know what it is. It is an old building so maybe that has something to do with it. Or maybe I'm just working with textiles too often and dust

just generates. Who knows? But I definitely notice that the volume of dust is much larger in this particular apartment that has been in the past. So, I have to dust more often. So, yes.

16. If you were to describe (in detail) the experience to someone, how would you describe it?

P 2.5: I would say that you are being asked to approach an object in a certain way, but that how this way manifests itself is up to you. And, I would probably leave it at that or something similar, because I wouldn't want to influence how they approach the object, by describing it to them. I feel that they have to do that on their own in order for the experience to be pure enough. And, that my experience might colour theirs, if I describe it too much.

R: What if that person wasn't supposed to get the piece, and you just describing how it was for you.

P 2.5: I would say that I was asked to bring an object into my home and interact with it in a certain way, but also approaching that as an individual. I would say that I was given certain information, while unwrapping the object. That it was given in a certain sequence. The way you wanted unwrapped it was quiet, sequential and I would say quite deliberate. And, the giving of information followed the deliberate half way. I would say that I had to engage with something, this artefact that looked like a decoration but it was intended for engagement. And, then I would describe to them the piece and I would describe to them what I was asked to do and the information that was presented to me, and also what came up while I was engaging with it and maybe what stayed afterwards with me.

17. In relation to your everyday life, did it change anything, did it add something? Did going through this experience, bringing and having the artefact into your home, allowing you to interact with it add anything to the rhythm of your everyday life?

P 2.5: I think much more about what I add and subtract. And because this layering pleases me so much, I make a point to consciously include that in my day, or in my work, or in my thoughts. I would say those are the two largest ones. Home has always been difficult for me to create. I grew up travelling, moving from place to place. My parents were refugees. Having roots was really difficult, so just the importance of home as a place and as a place that you care for, but that also cares for you. And that, that relationship between you and your objects and you and your home space is...umm. In years past I would move in a place and stuff would still be in boxes couple of year later, because I just always expected to move again. I guess I always felt like I was living in a hotel. And, so the idea of home and creating home, for me has to be very conscientiously done because it does not come naturally and creating spaces to stay in. The idea of having to leave at some point was always so large in my mind and I am trying now, to not have that be so large. Yes, you may have to leave at one point, but what are you going to do when you are here? Just be more present and really how can I make this space nurture me, and how can I nurture the space to make that kind of back and forth dynamic healthier and more relevant to who I am as a person.

R: In this context, how would you describe or define the everyday experience?

P 2.5: Home for me has always been a puzzle. I do spend a lot of time thinking about it because it comes naturally to so many people, at least that's how it seems from what I observe. And, homemaking has always been something that is very difficult for me.

R: How did the artefact influence those kind of thoughts?

P 2.5: I think I mentioned it at the beginning. It made me conscious of what I am bringing, and how it feels. Do I get pleasure from looking at it, from being around it and if not, why is it there? Why do I have this piece in my area?

R: Would that be a new dimension of the everyday experience?

P 2.5: Yes, much more touch focused. Because I know I am a tactile person, but again to bring that to a conscious level and say 'do I enjoy the things I touch in my home on a daily basis, yes, or no?' And, the things that I do enjoy touching, just to touch them more. You know, hold that cup of coffee and really enjoy the way it feels. My linens are this really plain, really comfortable, boring, but I love the way they feel, cotton. Sleeping under them at night is lovely. If I was sleeping under something that was polyester, I would always have in the back of my mind that is scratchy. So, it is mostly about being conscious of what's there and why I tend to block a lot of things. If they're uncomfortable I just block them. So, just stopping that and finding ways around that instead of just blocking it all and leaving it at that. This forced me to look, and it forced me to handle and ...I wouldn't say forced, I would say compelled and asked maybe to engage in ways, especially with touching that I tend to find uncomfortable and find ways around that blockage, the barrier I put up. So, I would say it was very helpful in that respect. And, my home looks and feels quite different than before.

18. What was your favorite part of the experience?

P 2.5: I have to say these things, these layers. I love them. Just because it is different materials. I started sewing maybe when I was three years old, my sister the same. I have a photo of me doing embroidery at six

years old. The idea of thread holding things together is something that has been in my life my whole life. The idea of holding very different materials together with a common thread, I love it. I love the way it feels, I love the way it looks, all those differences in texture and thickness and sound are fascinating. It may be silly, but I really love it. So, these little layered sandwiches you made are my favourite part by far.

19. What are the feelings/ thoughts it left you with?

P.2.5: The feeling of engagement with the home as a positive thing, instead of a thing that might be problematic. The direction that my art has taken, for sure. I found it delightful. I find these combinations of materials delightful, so it left me with a sense of joy.

20. Is there anything else you might want to add?

P.2.5: I definitely think that I am going to try, when making objects for the home, to use something delicate as a background. This is something that I have never, ever done. I am always about strength, it has to last for a million years. But, there is something really, really interesting about this. It's a bit like surrender, that you are using such a delicate material in such a strong position. And, that is something that I've never done. It is something that I would love to try. It goes against my grain completely, the idea of vulnerability as strength. Even though it is an idea that I would love to explore. The idea of an object being vulnerable and strong at the same time, or just plain old vulnerable. Yes, it is new and I definitely want to explore that. I've just discovered that downstairs they have a very large printer in the photo department that can print onto fabric, and I just about jumped up and down when I found this because, I have so many tapestry type pieces that I want to make and I want to combine my photography and my embroidery, and they have a material kind of like this. And, I wonder whether that might be really great way to test this out. Because for photo class I find out that my projects are not just digital. My final project for photo forced people to actually handle it in a book, and they had to actually turn the pages in and touch the thing. So, I think for my photo pieces is a great way to explore this idea. Lately, I am dealing a lot with environmental concerns in my art, ecological grief, so the idea of disintegration and vulnerability is quite high on my list of artistic priorities. Yes, I wouldn't mind doing a tapestry with this. A very, very delicate, see though background as the main material. We'll see where it goes. I am open to it and I think that's important too. Just to not have a rigid idea of where things are going because then you don't get the delightful surprises.

R 3.5 Follow-up Interview with P 2.6
Transcript [28 November 2018]

R = research student

P 2.6 = sixth participant from the second adoption experiment

1. R: How do you remember the experience of having the artefact in your home?

P 2.6: It was really beautiful to have it there. It smelled really nice and because of the smell, and because of my need to participate it made me think about it more than I would think about other things in the house. So yes, it was just really pleasant.

2. R: Could you please tell me what did you take out of it? Was there anything that stuck with you after returning the artefact?

P 2.6: The colours and the silk were really beautiful, as well as interacting with that beautiful silk. I think that it started me thinking what other things smelled like. I don't have a hugely great sense of smell but it made me notice things like 'the medicine cabinet smells really bad', and certain other things, like ambience smells that I wouldn't notice before, or like what the washing machine smells like. Things that are not really unpleasant but that normally I wouldn't notice.

3. R: Do you find the experience had meaning? Did it have an impact in any other way apart from what you were mentioning?

P 2.6: I guess because I know you and your other research, I always wondered (and you clarified this at the research talk) if it seemed like this piece would clean the air. Because it always seemed like it was kind of small and wouldn't have the impact that let's say the bird's nest did. I mean, the bird's nest is so small and objects are so big, and it is outdoors. But you clarified that at the talk saying that it was just to promote consciousness of these things not to actually act as something that would purify your house.

4. R: Are there any things you would change about this experience? Was there anything that you would have wanted to be different?

P 2.6: I think it would have been nice to have a huge one, because I do have room in my house. So, it would have been nice to have one floor to ceiling. A statement kind of thing. But I think most people don't have room for that.

R: What about the time, or when it happened or for how long it happened?

P 2.6: I could have lived with it longer, I think.

5. R: How do you remember the artefact? Can you talk about how it looked and what it did?

P 2.6: It was a loose drawing of plants and had scented paper attached to it. With shades of purple for the lilac and different shades of green for the mint. I remember they kind of stayed on. I expected them to all fall off instantly when the thread was gone, but something about being pierced by the needle made them adhere for quite a while. Sometimes they fall off later, or just one layer of the blotter, or whatever the thick paper was, stayed on.

R: What did the interaction involved?

P 2.6: Mine was crocheted, so it just involved starting at the right spot and undoing itself.

R: I actually have it here.

P 2.6: I can visit it again! Yes, I do remember that some of them got caught, because I started in the wrong point or whatever. And with some I had the determination in the sense of 'this has got to come off'. Or, it was satisfying so I wanted to find a way to get it off. Where these stitched? Is this really the one I had?

R: Yes, they are stitched?

P 2.6: Oh, so they are stitched down, so I would see why they wouldn't come off. I thought I remembered that maybe some are not already stitched down and would fall completely off.

R: No, all of them had the pieces that were sandwiched between two pieces of paper, one on the front of the piece and one on the back.

P 2.6: Maybe the ones of the back fell off.

R: I think so. The ones of the back are definitely easier to detach than these ones.

P 2.6: Yes, I have to say I don't remember these being stitched with the running stitch.

R: I think it is because a lot of them when you returned them they still had the white paper on them. So, then I went and I removed everything. This was the only one that was intact, it wasn't unraveled at all. So, that is why you did not see it like this.

P 2.6: I believe you but I think I would have argued with your saying that 'No, I'm sure mine did not have these', I'm sure this is not the exact one'. But, I believe you.

6. R: Do you remember what the artefact was about? If yes, could you please tell me?

P 2.6: I don't remember anything specific about this image but I remember that there were scented papers to clean the air and ones that could hopefully be replaced with new ones when they expired. And, I remember being a little panicky 'Oh, who would crochet these all back on? Not me.' So, that's basically what I remember: that it was to imitate the bird and to bring cleansing properties to the room.

7. R: The artefact was inspired by the nest behaviour of the blue tit female bird that was placing aromatic plants in its nest (as a way to keep their environment healthy). In a similar way, you had to remove from a panel in your home fragments infused with essential oils. What did it mean to you the act that you were engaged in (i.e., replicating a behaviour similar to the bird behaviour)?

P 2.6: I did not really think about replicating the bird. Because it came to me, it was given to me, I did not have to collect things. I found really satisfying interacting with the textile thing. Especially the unravelling. I saw the other ones at your talk and I don't remember exactly what they looked like but I do remember that there was a huge variety and that the others weren't crocheted. I forget what the other were doing, but I remember that there was a huge variety both visually and in the interaction technique. Like I said, I really enjoyed unravelling the crochet and just that knowledge that I have to find the right spot. So, it was just, enjoyable, like a nice distraction during the day like 'oh, I am supposed to be doing something'. But I did notice it because I could smell it when I walked by, so it wasn't like I had to put it in my notebook to remember. I might have felt differently with a different process, I'm not sure.

8. R: Did you think at all about that connection? Did you continue thinking about that at all?

P 2.6: A little bit. And, I remember at one of your talks you mentioned how a lot of the allergens in our house we bring them in, with the furniture, fabrics or whatever, so I did think about it. And I did think about what do you bring in? I know plants, live plants make oxygen and take away carbon dioxide. So, yes it did make me think about healthy things in the house. My cat died recently (I think I mentioned that at the previous interview), she probably wasn't the most dirty thing in the house but she created a lot of allergens unintentionally.

I have always been a little confused about essential oils because it seems like they have really risen in popularity at the same time that everyone is going fragrance free, so I never quite understood why some scents are good and why some scents are bad. It must be what is added to commercial scents or perfumes. I'm not sure. Or, if some people are just allergic to stuff. I heard that a lot of drug allergies that people have are actually because of the binders, and the additives. So, it isn't the actual medicinal ingredients.

R: Yes, I think that is the issue with the perfumes. Because they keep the recipe private. So, it is advertised that it has essential oils like lavender, but you don't know what are the other things.

P 2.6: Other than alcohol, I know they use a lot of rubbing alcohol, and that sort of things.

R: I am going to go back on this question a little bit, which was 'Do you still think about this (i.e., the fact that you were engaged in a behaviour replicating the bird behaviour)?'

P 2.6: I think not so much of the bird, more of the bringing clean things into the house. I don't know if this is a question further down, or something that I remember from your talk, and that is 'did it make you think in general about things in the house?'. It's probably a coincidence, but it may be why I am so interested. A friend started selling Norwex products. Something that is made in Norway, that people sell though parties like Tupperware, but their microfibre cloths allow you to clean without cleansers. Because of the nature of the fibre and some silver thread in it, it does not mould. So, you can continually wipe up. Then there is something that they call the glass cloth, so you can actually wipe your windows with just a wet cloth. And then there is a drying cloth so there are no streaks. So, it gets rid of all the chemicals in cleansers and stuff like that. Especially when you have pets and kids that are pressing their face against the glass. They also have a laundry detergents that isn't polluting and also cleans out the inside of your washer just coincidentally. They have Swiffer like products but you don't throw away the things, instead you can wash out. So, I found those very interesting. I don't know if there is a connection, or it's just because of my neighbor but it is interesting to think about these. With the cleaning things, the cloth always stays pleasant. Sometimes when you would wipe something up with the cotton cloth (and usually I am all cotton) you just feel that you have to put it in a plastic bag until you do laundry again, it is so disgusting. But this just rinses out, dries and it doesn't smell and you can use it a few times. But I don't know if there is a connection between me thinking about my house and bringing good things in the house and not bringing back things in the house, and this.

9. R: If you remember, could you please tell me what were some of the things that you thought of while having the artefact in your home and after returning it? Do you happen to still think about

these things?

P 2.6: I think just that it was beautiful. That it was a really nice growth from the very first piece that you showed when you came for your interview. That it seemed much more contemporary than the individual image. That it was enjoyable and it was nice to smell and think about something in the house. Because, we supposedly have all these things in our home because we love them, but I find they become part of the background and I don't really notice them anymore. Whereas with this piece, because of the multisensory thing, and because I had to do something, I always noticed it and appreciated it.

R: Do you still happen to think about this?

P 2.6: I think probably not. Mostly because I took something down to hung it up and then I put the old thing back up so there is not an empty space. But I am always interested to hear what is going on with your research. I remember it enough to come to your talk. I was really glad to see the other ones. It was nice to see all the varieties you came up with.

10. R: While having the artefact in your home you acquired a new behaviour, of interacting with an object in your home. Did this behaviour extend beyond the time you had the artefact in the home?

P 2.6: I wouldn't have the piece to unravel but I suppose yes. I decided to make some changes on what was hanging on the walls. Partly because I made a little bit of new work. So, I thought 'okay, this has been here long enough, I want one of these upstairs'. I guess that would be it, just rearranging the artwork.

11. R: Could you please talk about what it did for you to engage in this type of action? Did it make you consider any thing in particular that you haven't considered before?

P 2.6: I think that it was enjoyable and it was pretty. I did wonder (it did release more scent as I pulled out the thread, which is the idea) so, I wondered 'I am enjoying it, but it is changing anything in the house?'

12. R: In the last nine months, did you develop or change the way you behave at home?

P 2.6: I think getting these products from my neighbor, and eliminating some cleansers and just thinking about other things that I have in the closets and don't need to be washed as often because they are pleasant and are made to not be washed as often. I don't know if it is because of this, but I really liked their detergent, because I always stress out about laundry detergent. It's going down the drain, and you have no idea what is doing, and what is doing to your clothes. With the expensive ones, I think 'okay, it's taking care of the cotton, it has the little cotton thing on it'. But then the cheaper ones I'm wondering 'they're not taking care of the cotton?'. So, this is what it solved that and, it might be related to this piece.

13. R: The interactions you engaged in were slow and required you to be rather gentle while handling the artefact. Did you continue interacting in this way with the things in your home environment?

P 2.6: I think I am usually pretty careful with textiles. Belongings that are not textiles I am not so careful with. What month did I have it?

R: February. nine months ago.

P 2.6: Okay, so I was here on my own. I think I felt more personal about it because I wasn't interacting with other people at home, because he was away. So yes, I think it was a nice personal thing to be taking care of something or to be closely interacting with something nice. Otherwise I was leaving the house to interact with people, because there was no one home.

14. R: During our February interview, you questioned about the role of oils and about the idea of bringing oils/ plants in your home as a way to replicate the bird behaviour. Did any of these thoughts take any shape? If yes, what shape?

P 2.6: I guess I have kept the plants that I had. Although, because I am away so much, I think about giving them away. I just planted two plants that don't need much water. I mean they do better when they have water, but they don't die when I am gone. So, other than these new environmental products I don't think so. I hope I am bringing less bad smelling stuff into the house. One thing that happened is that I used to use bleach on my ceramics, on the white handmade ceramics that get tea stains on them so easily, especially if they are not smooth inside or if there are any crevices. So, I used to use diluted bleach in those, but the bleach I see in stores now, says 'safe for colours', so though 'well, that's not what I want, the whole point was that it was taking the colour out'. So, I figured it was pointless to buy the bleach, so when I ran out of my old-fashioned bleach I did not know what to do. But again, my neighbor who is selling the stuff. There's like a marble, scrubbing paste that doesn't scratch things, but that is a little abrasive, and so that works for my tea stains. So, I am taking care of my handmade ceramics, my commercial dishes I don't take such a good care of.

15. R: Do essential oils/ plants play a role in your home now? If yes, what is the role?

P 2.6: Mostly I just like to look at them. I don't have a great sense of smell. I like feeling like something is alive in the house. Especially now that the cat is gone, I do sometimes buy just seasonal plants that I know aren't going to last, and that I know I am not going to maintain. Which were somewhat dangerous for the cat, so I didn't do it then. I think I am less likely to buy pot flowers, because I see all that pollen coming out and my family when they are at home, they have allergies so I guess I never really thought about it. You just buy flowers, this is what happens. But now I am thinking like 'oh, is that stuff going to have a bad effect on someone because of the pollen?'

16. R: In the last months, did you pay more, less or about the same attention to dust, smells and fumes as before having the artefact in your home?

P 2.6: To dust a little more, and partly it was not having the cat. I think I pay more attention to dust, I notice it more and I want to clean it up more.

R: Why do you think is that?

P 2.6: I think it's just because I am thinking about a healthy house and trying to make something positive out of the cat being gone.

17. R: If you were to describe (in detail) the experience to someone, how would you describe it?

P 2.6: I think I would explain your project, that it is so interesting. That you were talking about biomimicry. What is interesting about that is that I used to think about biomimicry as being things like Velcro, something physical. Well this (the artefact) is physical, but something to do with physical interaction rather than scent. And, where it came from, that it came from the bird and bringing things into the nest. And that this was bringing it into my home. Apart from liking unraveling the crochet, was knowing that I was releasing the scent gradually, that it was a manual time release process. And it was a nice thing to have in the house. I really liked the design.

18. R: In relation to your everyday life, did it change anything? Going through this experience, brining and having this into your home, allowing you to interact with it, did it change/ add anything to the rhythm of your everyday life?

P 2.6.: I think it was nice to have something to engage in that wasn't just the television, the radio, my loom. Especially because I was home alone for that month. It was nice to tend to something that was more like a plant. That wasn't cleaning or maintenance or washing dishes. It wasn't something laborious or unpleasant, or something that I wouldn't do if I had to. It was something I would do (of course I didn't have to, I mean I committed to). It was nice to maintain something that gave back. I guess that's it, that gave back. Washing the dishes, I suppose it gives back, but...

R: But, not in the same way.

P 2.6: No, not in the same way.

R: When you say giving back, what do you mean?

P 2.6: If it would have been a bit more involved I guess I could say it would have been a bit like meditation. Something that doesn't have any factual idea that is giving back. It's not growing more leaves like a plant or giving me something to eat like cooking, but that you feel that little by little improved your life, makes your life a little better.

19. R: What was your favorite part of the experience?

P 2.6: I think the colours and interacting with the silky thread. I like picky little things, unravelling.

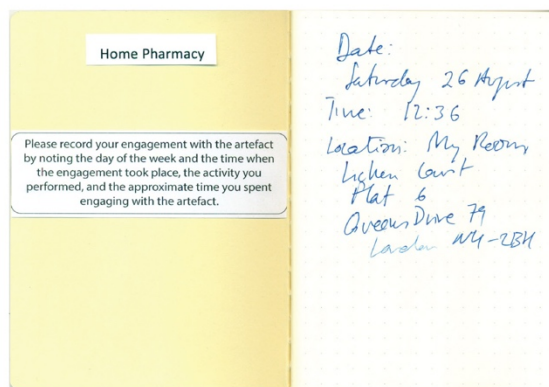
20. R: What are the feelings/ thoughts it left you with?

P 2.6: I think it was nice to have a beautiful thing in my house and it was nice that it wasn't just a static collectible thing. I have a textile collection and I do not interact with it much. It's folded and in labeled boxes. And I could get it out and rotate it but I don't. So, it was nice having a beautiful thing that I noticed all the time. It was also nice to see that your project had progressed since you came here for your lecture. It thought it made me think about PhD work and textiles and what was coming out of that, and how textiles might become or craft objects might become something that people would own for a variety of reasons, other than just physical use, like a bowl or decoration, something that you just look at. It made me think what would that other dimension be, in other media.

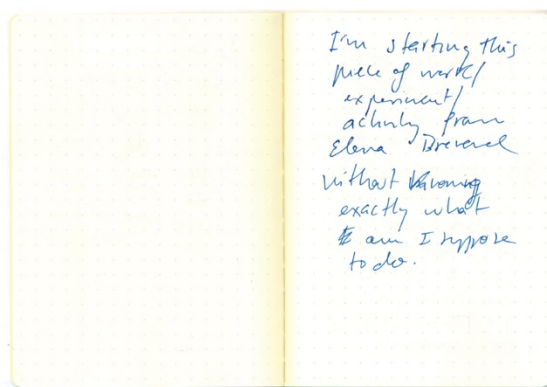
21. R: Is there anything else you might want to add?

P 2.6: Because there were so many different ones that I just saw at the lecture and I don't really remember in detail, I guess it would be nice to see a show, to look at all of them and read what other people had to say. I guess it would be interesting to know how people who weren't involved in textiles would think. I felt, I did not come to it with zero expectations. I knew about the project, I knew you, I love interacting with textiles. I don't know if would be the same for someone else, let's say my neighbor or my friends who aren't artists, so I guess I wondered about that.

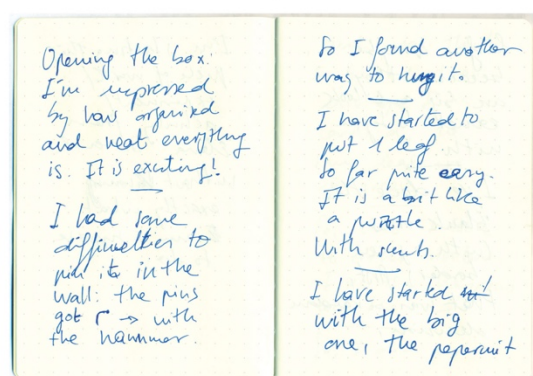
S 1 Journals scans from the first adoption experiment

S 1.1 Journal for *Home Pharmacy*

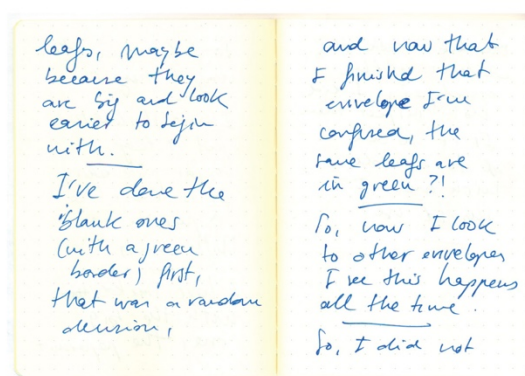
Page 1



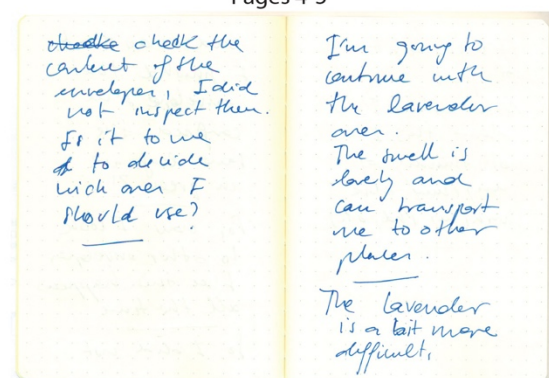
Pages 2-3



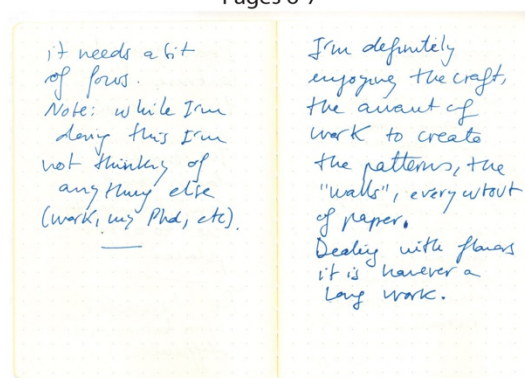
Pages 4-5



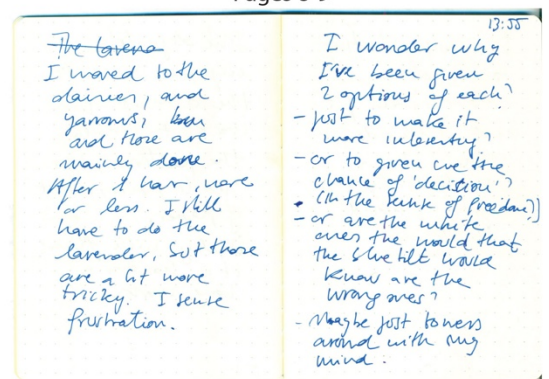
Pages 6-7



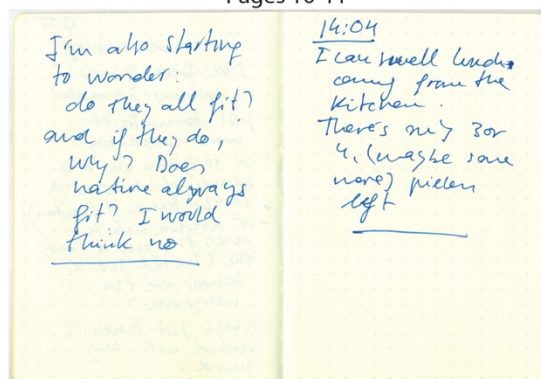
Pages 8-9



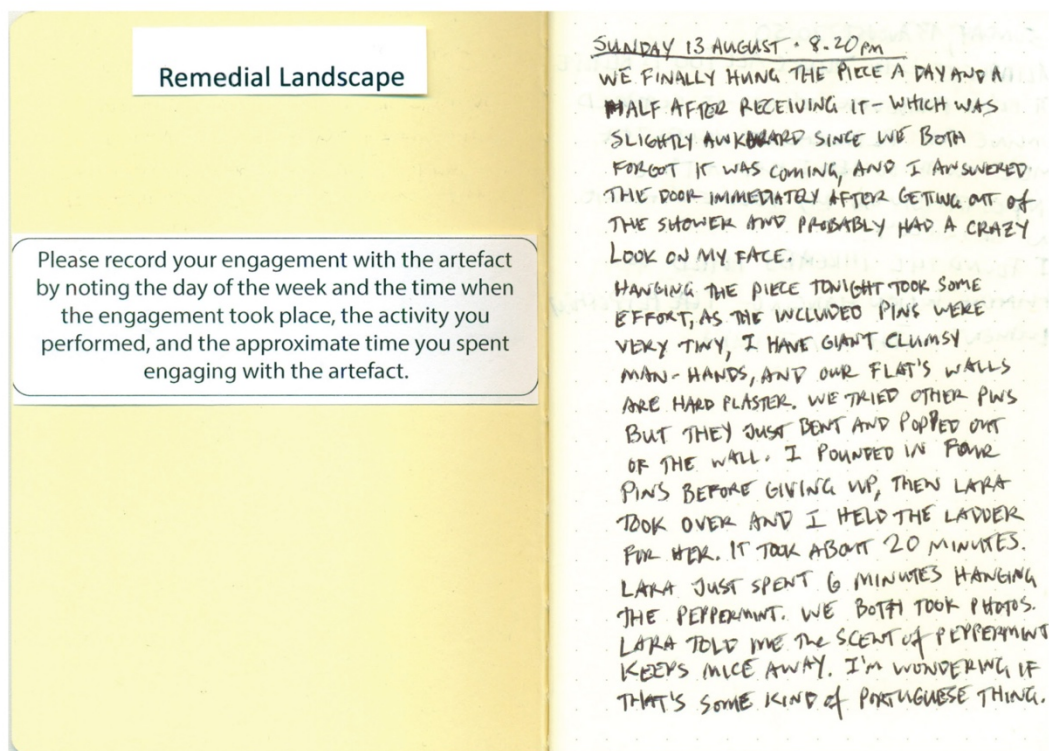
Pages 10-11



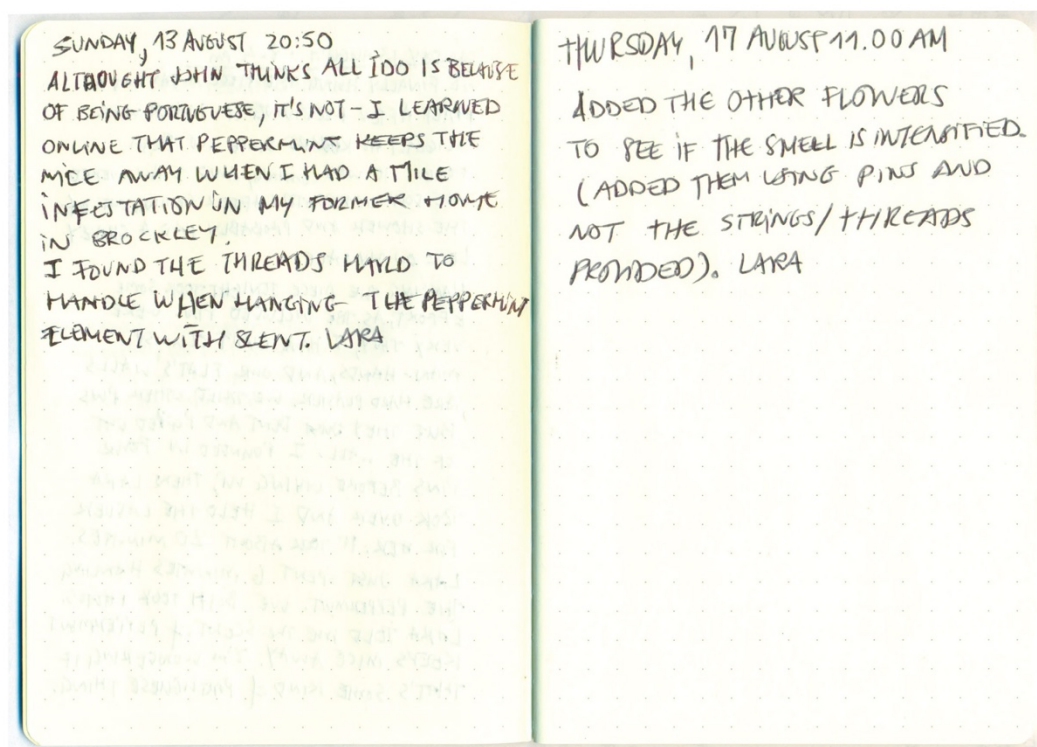
Pages 12-13



Pages 14-15

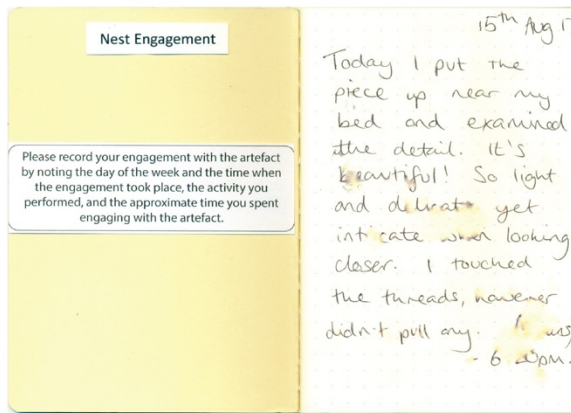


Page 1

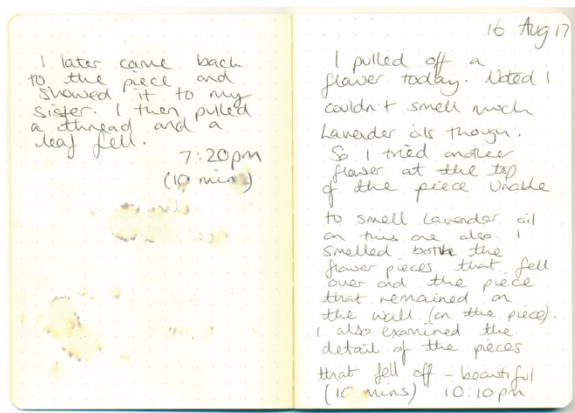


Pages 2-3

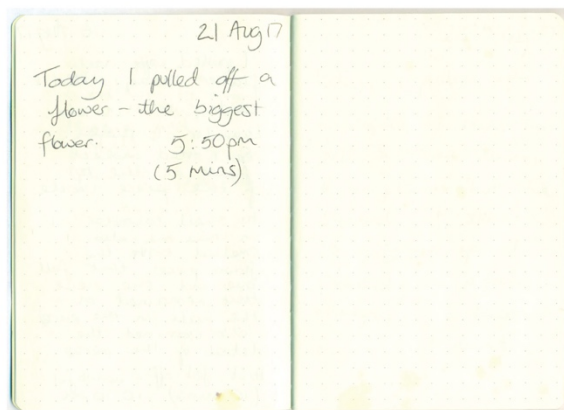
S 1.3 Journal for Nest Engagement



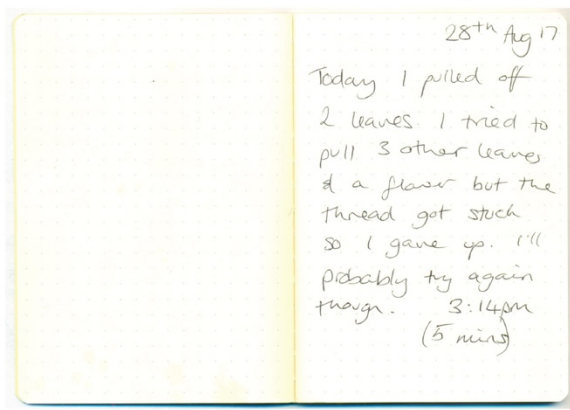
Page 1



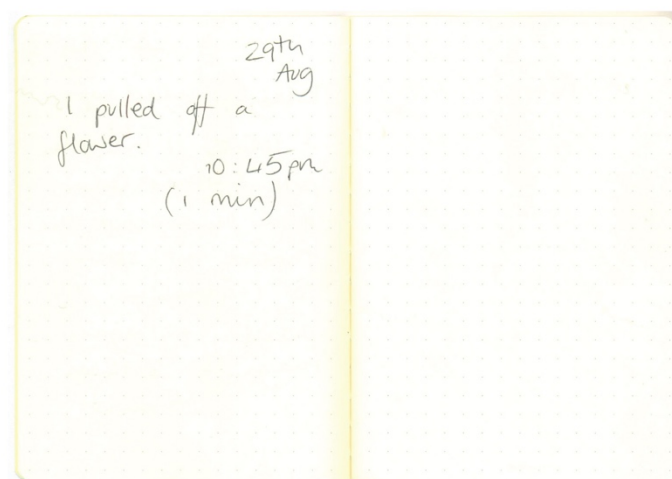
Pages 2-3



Pages 4-5



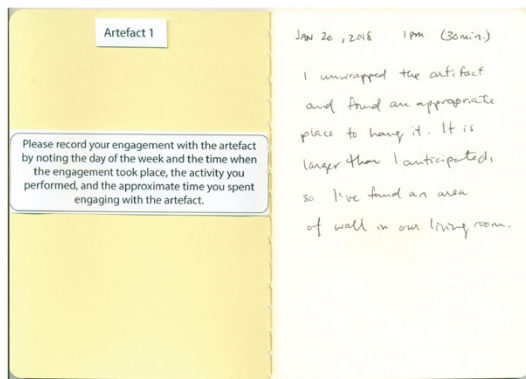
Pages 6-7



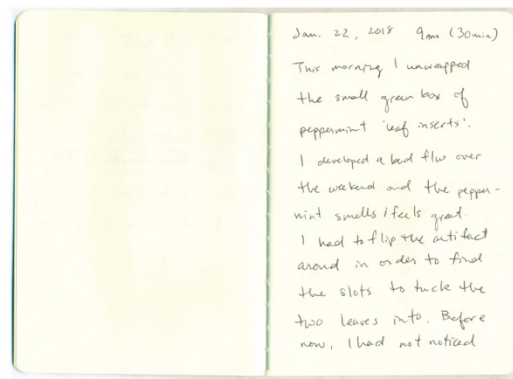
Pages 8-9

S 2 Journals scans from the second adoption experiment

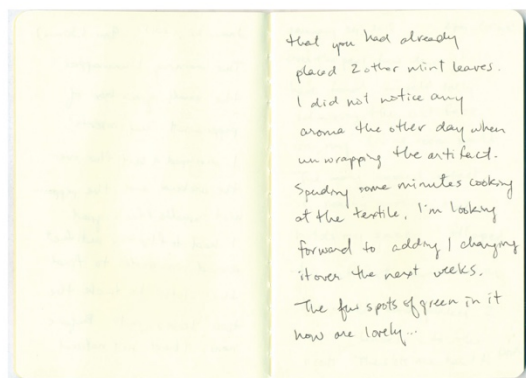
S 2.1 Journal for Artefact 2.1



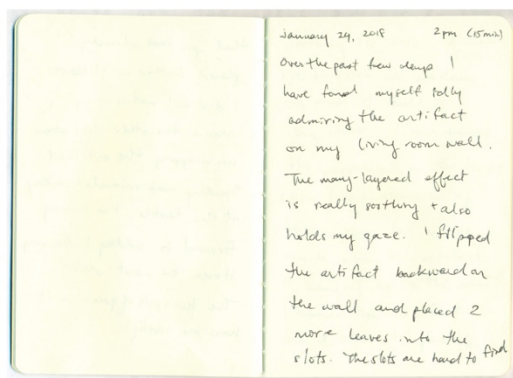
Page 1



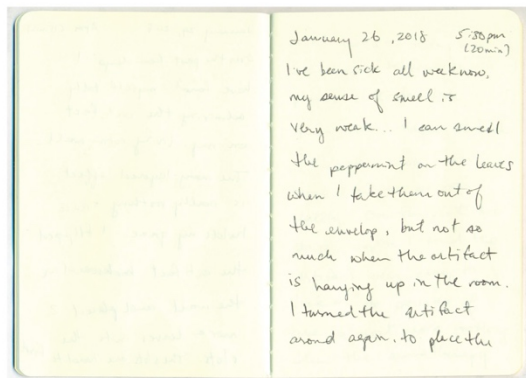
Pages 2-3



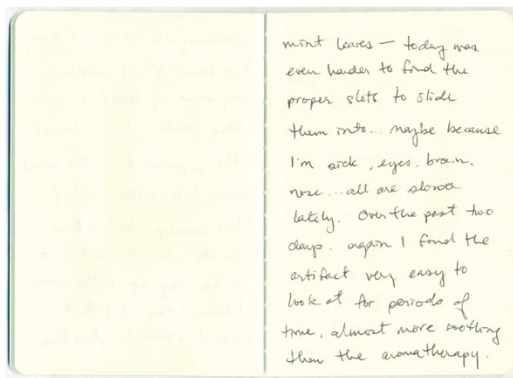
Pages 4-5



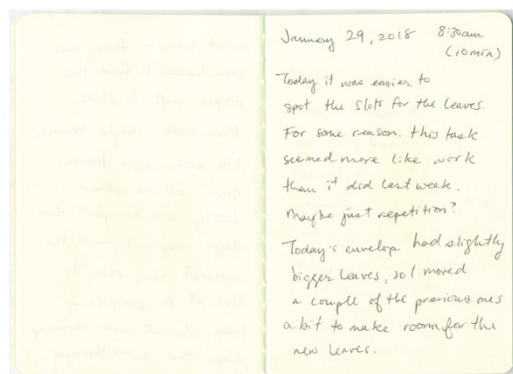
Pages 6-7



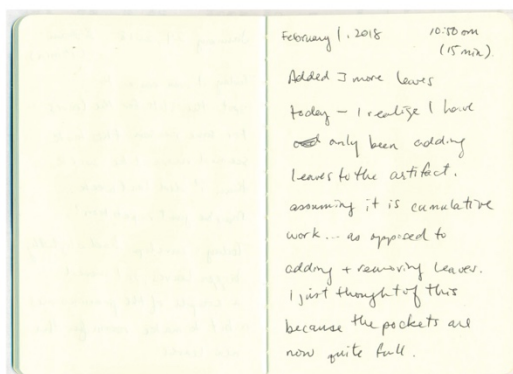
Pages 8-9



Pages 10-11

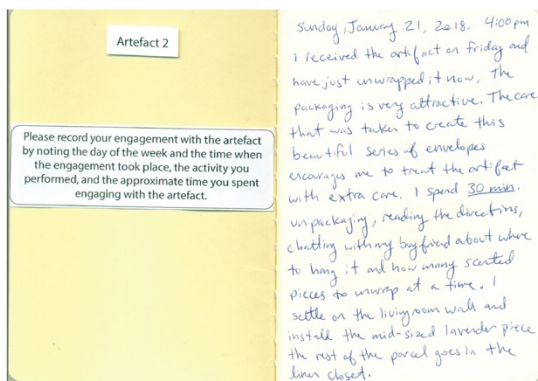


Pages 12-13

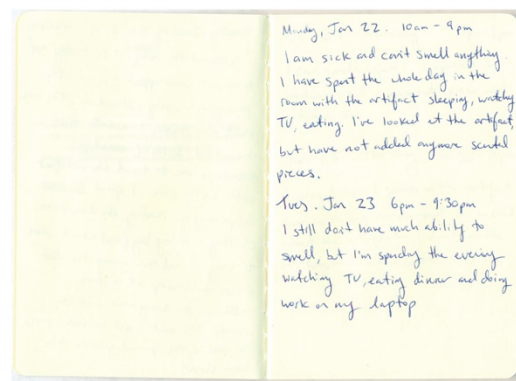


Pages 14-15

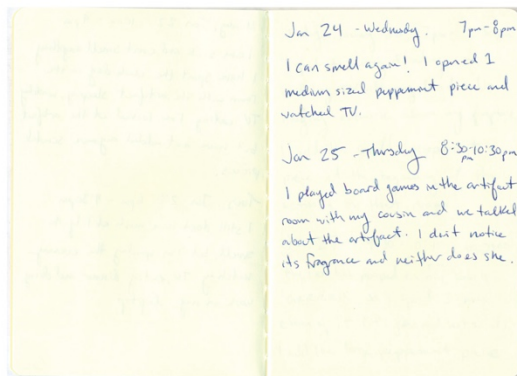
S 2.2 Journal for Artefact 2.2



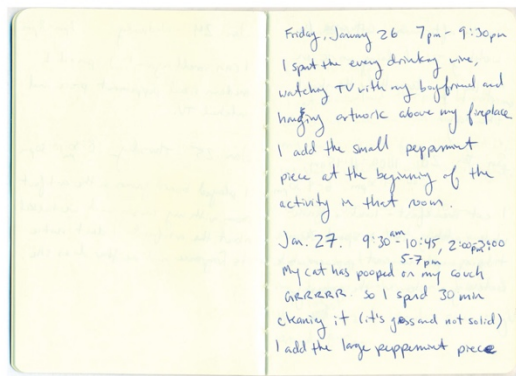
Page 1



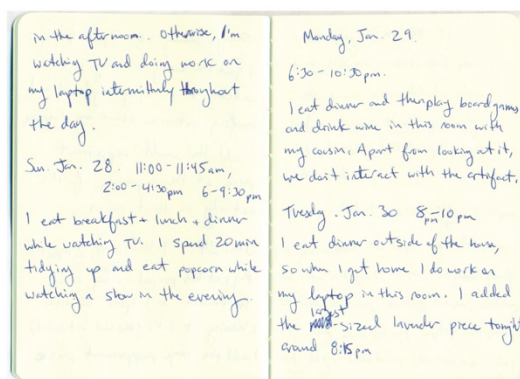
Pages 2-3



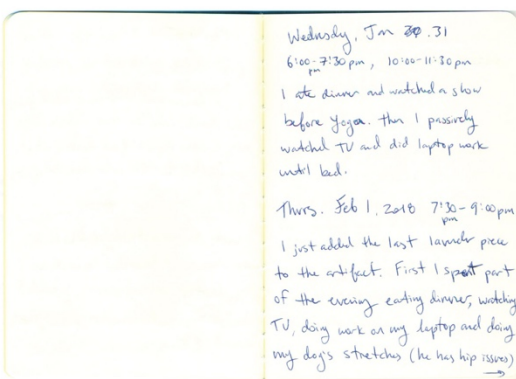
Pages 4-5



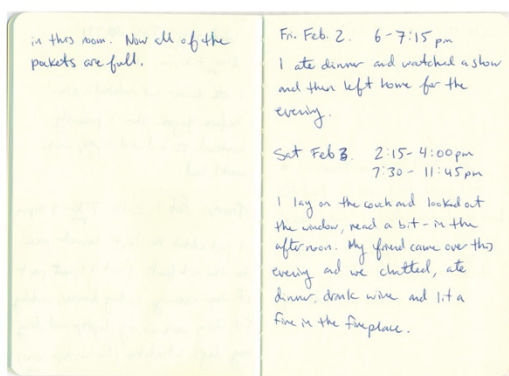
Pages 6-7



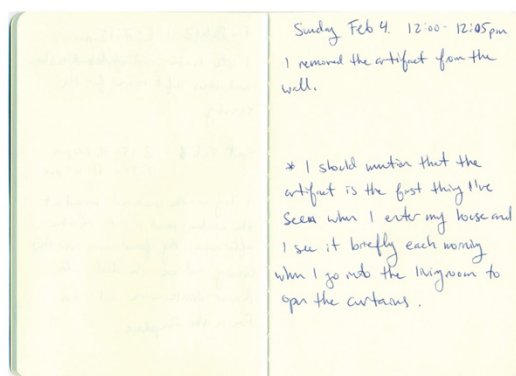
Pages 8-9



Pages 10-11

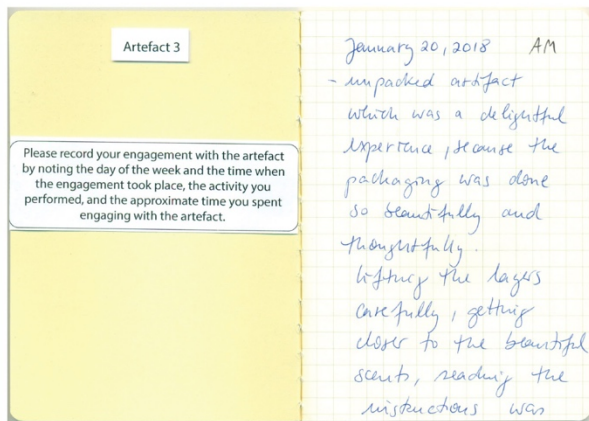


Pages 12-13

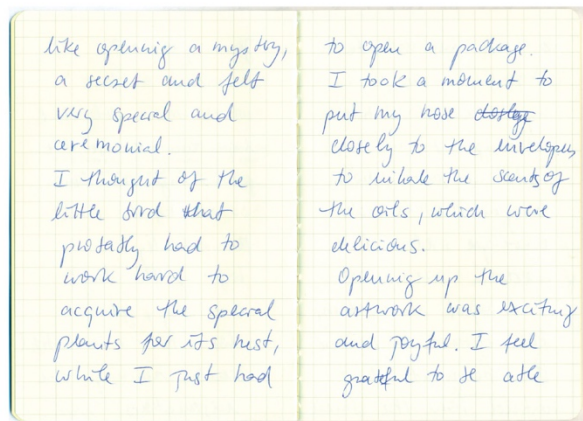


Pages 14-15

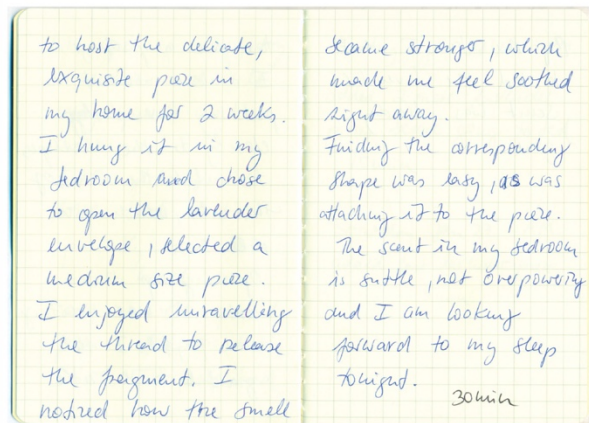
S 2.3 Journal for Artefact 2.3



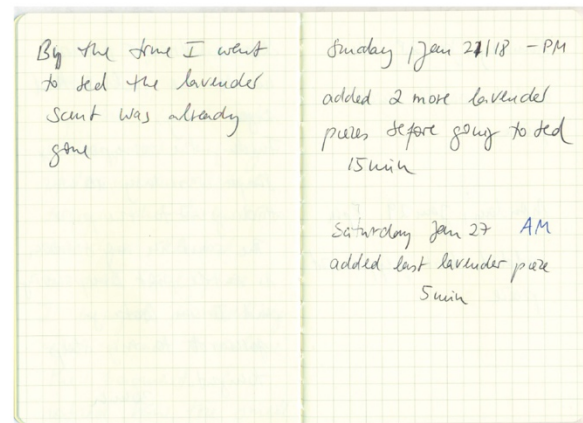
Page 1



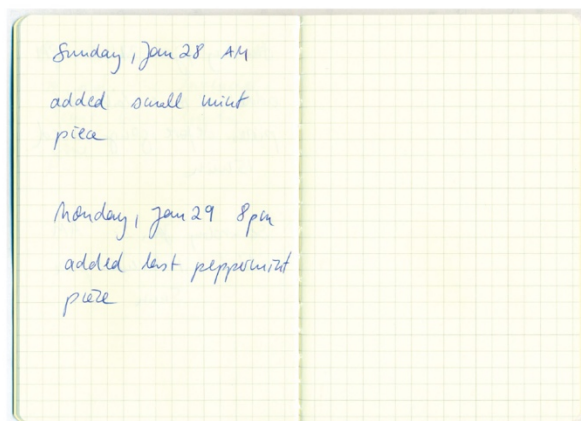
Pages 2-3



Pages 4-5



Pages 6-7



Pages 8-9

S 2.4 Journal for Artefact 2.4

Artefact 4

Please record your engagement with the artefact by noting the day of the week and the time when the engagement took place, the activity you performed, and the approximate time you spent engaging with the artefact.

Friday, January 19th, 2018

7:30pm: I unwrapped the piece and walked with it around my apartment to choose a spot to hang it. I placed the piece against various wall spaces and beams trying to choose a spot where I would interact with it regularly. I chose to hang the piece from a beam that is in my bedroom, across from my bed. The room is a loft that overlooks the living room, from here I can see the piece from both the bedroom and living room. In this spot the piece will catch a lot of light from the living room window. After choosing a spot for the piece I felt the fabric and looked at/admired the

Page 1

Saturday, January 20th, 2018

9:40am: After waking up this morning I looked at the piece and began to pull the thread of one of the smaller paper petals.

Time spent: 5 minutes

11:30am: I finished unwinding the smaller petal. It did not immediately fall off of the piece. I touched it and it fell to the floor. I picked it up, smelled the lavender, and placed the petal in the envelope. I placed the thread on a ledge next to the piece.

Time spent: 5 minutes

Pages 2-3

2pm: I unwrapped another petal, it did not fall off the piece so I have left it to see if it will fall off on its own.

Time spent: 2 minutes

5:30pm: Sitting on the couch in the living room I looked up at the piece to see if the petal has fallen. It has not yet. I looked to see if it is on the floor, it is not. The petal has not fallen off the piece yet.

Time spent: 2 minutes

9:30pm: The petal still has not fallen off. I started to unravel another petal. I also feel the fabric and admire the newly exposed purple colors.

Time spent: 2 minutes

Pages 4-5

Sunday, January 21st, 2018

10:30am: The paper petal was taller to the ground. I picked it up and placed it in the envelope. I completely unraveled another four petals, and placed the threads on the ledge. I admire the piece, now the morning light goes through it.

Time spent: 6 minutes

1:30pm: I touch the four paper petals that have been unraveled and they fall to the ground. I smell the lavender, and place them in the envelope. I unravel another two petals. One has a tight crocheted band does not want to come undone. I

Time spent: 5 minutes

6:30pm: I am on the couch in the living room, I look up at the piece to see if the petal has fallen. I also check the floor. It has still not fallen.

Time spent: 1 minute

8:15pm: I carefully unravel the petal that has the tight crocheted band. I touch both petals that are unraveled and they fall to the floor. I pick them up, smell the lavender, and place them in the envelope. I place the threads on the

Pages 6-7

ledge. I admire and look at the new colors revealed in the piece.

Time spent: 8 minutes

9:10pm: I touch the petal that has been unraveled. It falls to the floor, I pick it up, smell the lavender and place it in the envelope. There is only one petal left. I touch the new colors in the work that are revealed. This petal was the largest of all the petals and the paper underneath has very beautiful shades of purple printed on it. There is only one petal left to

Time spent: 6 minutes

Monday, January 22nd, 2018

6:15am: I started to unravel the last petal, but will finish unravelling it later today. I also take a look at the petals that have been collected in the envelope over coffee this morning.

Time spent: 5 minutes

6:45pm: I finished unravelling the last petal. It fell to the floor. I placed it in the envelope.

Pages 8-9

There is now a collection of threads beside the piece, on the ledge where they have been collecting. The piece looks beautiful with all the revealed colors and shapes of the petals.

Time spent: 5 minutes

11:30pm: I admired the piece before going to bed. It's interesting to see how the piece has changed over the past couple days with the falling of the paper petals.

Time spent: 2 minutes

Tuesday, January 23rd, 2018

7:45am: I spent a few minutes this morning after I woke up admiring the piece and all its colors. While getting ready for work I accidentally knocked the pile of threads off the ledge. I picked them up and placed them where they had been before.

Time spent: 5 minutes

6:30pm: I admire the piece in the evening darkness. The dark hues of purple are very beautiful in the low light. The colorful threads on the ledge also look interesting.

Time spent: 3 minutes

Pages 10-11

11pm: I touch the fabric and notice how the petals I notice the way the colors are related into the fabric. I think about the shape of the petals. Be reminded of a bird.

Time spent: 3 minutes

Wednesday January 24th 2018

7am: I spent a few minutes admiring the piece after I wake up this morning. In the morning all the colors are very vibrant against the morning light. Now that all the petals are unweaved from the piece, the shapes of the piece are very striking with the colors revealed.

Time spent: 4 minutes

6:30pm: Walking past the piece, I stopped and touched the threads that are sitting on the ledge.

Time spent: 1 minute

Pages 12-13

9:30pm: I opened the envelope of lavender infused petals and smell the lavender.

Time spent: 2 minutes

11:30pm: Before going to bed I spend a few minutes looking at the piece, and take notice of the colors and shapes. The piece looks so different without sunlight in the background. In the evening the darker colors are very striking against the beige backdrop.

Time spent: 3 minutes

Thursday January 25th 2018

7:30am: After walking around, getting ready for the day I accidentally knock the threads off the ledge where they have been sitting. I move them on top of a dresser near by, as to stop them from falling off the ledge.

6:45pm: I notice the piece from the living room while looking up. I consider for a minute turning the piece around to face the living room.

Time spent: 2 minutes

Pages 14-15

10pm: Before going to bed I look at the piece and think about what my experience with the piece would be if it was turned to face the living room.

Time spent: 3 minutes

Friday, January 26th 2018

7:30am: Over coffee this morning I spend a few minutes looking at the piece and the threads on the dresser. I decide to move the threads back to the ledge they were on originally. The threads look more like they are in the right place when they are back to the piece.

Time spent: 4 minutes

7pm: I listen to music in my room, and also am doing some my work on my computer.

Pages 16-17

I look up at the piece frequently, and find myself thinking about it a great way to take work breaks.

Time spent: intermittently over the course of 2 hours

Saturday, January 27th 2018

9am: I spend some time this morning listening to podcasts, in bed drinking coffee, having breakfast and generally a lazy morning. The sun is shining through the window and I am really enjoying my morning. The piece looks beautiful, and I find it is really adding to the relaxed atmosphere of my Saturday morning.

Time spent: Intermittently over the course of 1.5 hours.

Pages 18-19

3pm: I spend a couple hours working on a conference presentation in my room, and I have some music playing in the background. I look at the piece throughout my working time. I find myself looking at the piece as a work of art, and not just as a piece of fabric. It really makes working on a conference presentation a more productive experience. Also more productive.

Time spent: 2.5 hours intermittently

Sunday, January 28th 2018

10:30am: Again, I have another lazy weekend morning, drinking coffee in bed. It is not as sunny as yesterday morning, but I still enjoy the morning routine. Listening to podcasts and having breakfast. Again I can be notice on the piece and some time this morning looking harder at the piece shapes. That was when the colorful petals stitched into the fabric. They have interesting shapes that are less fluid than the colorful petals.

Pages 20-21

providing an interesting backdrop for the colors. The jagged outlines of these shapes is an aspect of the piece I am starting to take greater notice of.

Time spent: 1 hour intermittently

4:30pm: Again I spend some time working on my conference presentation in my room. When taking breaks I make a note to deeply admire the individual colors in each petal.

Time spent: 2 hours intermittently

8pm: I turn the piece around to face the living room instead of the bedroom. It stays on the same hooks in the same spot just reversed. I believe it will be great to view the piece from the living room.

Time spent: 5 minutes.

Pages 22-23

Monday, January 29th 2018
6:15 am: I wake up early to go to a yoga class and find walking up to looking at the other side of the piece a much different experience. I miss walking up to the colors seen on the front side. While getting ready for the day I take notice of my different feelings towards the piece. Time spent: 20 minutes intermittent.

7:30 pm: While looking at the piece from the living room I enjoy the fact that it is a flipped around. Seeing the colors and shapes from the living room is a much different experience than seeing them from a much closer distance in the bedroom when it was turned to the other side. The colors and shapes look more vibrant. The brighter centers of the petals stand out. Time spent: 5 minutes

Pages 24-25

11 pm: While getting ready for bed I do not take as much notice of the piece but rather think about how the placement of the piece dramatically changes my experience with it. Time spent: 5 minutes

Tuesday, January 30th 2018
7:15 am: I wake up, make coffee, and look at the piece from the living room, as it is still facing this room. From the living room I view the piece from a lower view than when it was facing the bedroom. The piece is more distant, but still very beautiful. My opinion of the piece from here feels more formal than when I was viewing it from a closer distance in the bedroom. Time spent: 10 minutes

Pages 26-27

8 pm: While cooking dinner, I open the envelope with the lavender infused petals and think about the possibilities of cooking with lavender, as I have really enjoyed the smell of these petals.
10:30 pm: Before going to bed, I suddenly find the piece back to how it was originally placed in the bedroom. I want to wake up to the colors of the piece tomorrow. Time spent: 2 minutes.

Wednesday, January 31st 2018
7:30 am: I enjoy walking up to the piece again and am glad I turned it back to its original position. I spend some time at breakfast looking at the piece from my room and think about my different impressions of it over the past couple weeks. Time spent: 20 minutes intermittent.
5:30 pm: I pull the petals infused with lavender out of the envelope and lay them out on the coffee table to look at for a little bit. Time spent: 6 minutes.

Pages 28-29

10:30 pm: Before going to bed I look at the piece a bit and look periodically at the piece. I think about how different and less formal my impression of it is in the bedroom, rather than when it was in the living room. The threads still are on the ledge, I have not moved them. Time spent: 1 hour intermittent.

Thursday, February 1st 2018
9:30 am: I wake up very early this morning and decided to get up to a bit before going back to sleep. When I turned the lights on I noticed a tiny spider near the piece walking on the wall. I watched the spider walk along the wall for a bit before going back to sleep. This was the first spider I have seen in this apartment. Time spent: 20 minutes

Pages 30-31

6:30 pm: Before going out for the evening I pack away the threads on the ledge in an envelope. I leave the envelope on the ledge. I take notice of those bright colors, as well as the colors of the sticks in the piece. Time spent: 7 minutes.
11:30 pm: Before going to sleep I take a look at the shapes of the petals and their colors, as well as the color of the sticks in the piece, and the larger, more jagged, beige parts of the

work. I reflect on my time spent with this work, as well as the impression it has left on me. There is space. It was lovely having such a beautiful and unique work in my home. I also was open my mind to the idea of trying out in different parts of my home new textures, as well as the possibility of incorporating them into my home. Time spent: 5 minutes

Pages 32-33

S 2.5 Journal for Artefact 2.5

Artefact 5

Please record your engagement with the artefact by noting the day of the week and the time when the engagement took place, the activity you performed, and the approximate time you spent engaging with the artefact.

Page 1

Jan 30, 2018
10:00

Although I brought the piece home last night, I waited to hang it in the daylight. This is quite normal for me; "action items" like decorating, cleaning, errands, and work projects are most successful when done during the day, while the more passive, fluid, creative activities such as thinking, dreaming, reading, planning, messy writing and experimentation flow best in the evening, night, and very early morning. Unwrapping the artifact had a ritual feel. The delicate materials and multiple fastenings made me respond with gentleness, and I took my time. I am a very tactile person, and touch drives my decisions just as much as vision, sometimes more so. I enjoyed feeling the different textures while unwrapping the piece, and the layers of both texture and information were both fun and calming. I read and handled all of the

information and envelopes before lifting out the artifact. The transparent main fabric was a surprise. If I think about why, I realize that I don't expect to be able to see through pieces on the wall - we tend to call them "wall coverings" and they are often used to hide unsightly features. Another reason for the surprise was the contrast between the delicate main fabric and the compact, much heavier stitched-on frame. It's not a combination I see very often in my daily life, but it wasn't unpleasant. I noticed that I weighed the artifact in my hands before moving it too much, to check how it moved in space. I hung it on the wall above my desk, also visible from my bed. Both the act of hanging it and the finished look inspired me to clean up all the stacked books and papers on the desk surface (a very good thing because looking at such ~~stages~~ makes me tired and irritable, yet I keep leaving them out...).

I spent at least 10 minutes touching the piece. Although I enjoy the main fabric's transparency, I do not like the feel of it; I find it scratchy, and this is quite normal for me because I don't generally enjoy the feel of synthetics. I do like the layered quality of the attached pieces though. The sandwich of different materials feels and looks interesting, and I want to touch them despite the synthetic matrix. I spent a few minutes looking at the hand stitching and crochet and realized that it has been too long since I did these activities myself. I also smelled some of the attached pieces, and could detect both the essential oils and the smells of textile and paper. I don't feel like unwrapping anything yet, I want to look at it and touch the materials a few more times.

Pages 2-3

Jan 31, 18
10:00

Today I did not unravel anything, but spent a few minutes at a time looking at it when I felt stressed. The textures and organic shapes were calming, and so was the overall floaty look. Between 5-10x throughout the day.

Jan 22, 18
13:30

Unravelling the 3 leaves in the bottom right corner of the artifact. The threads released easily; I felt the slight vibration of stitches as they released from one another, and a sort of picking sound as they released from the paper. I no longer smelled the essential oils on the pieces which I released. Unravelling a piece of art on the wall felt a bit taboo, but it was cathartic. I grew up on a farm in the woods, so anything that echoes natural cycles or suggests impermanence feels calming.

Pages 4-5

Jan 23, 18
18:00

Spent some time looking at the piece after waking up this morning. Something was bothering me, and after a while I realized it was the released portion. I think I preferred the contrasting effect of the threads.

Jan 24-26

During these days I was very busy with assignments and my only interaction was looking at it in the morning and evening. I found its appearance calming for stress, but still preferred the intact threads.

Jan 27
09:24

Spent some time looking at the piece after waking up, and then decided to unravel one of the flowers (topmost one). Unravelling felt cathartic again, but this time

I did not enjoy the sound of it as much because I had the beginnings of a bad migraine.

Jan 28-29

Little to no interaction due to bad migraines. Spent most of the past 3 days in bed with a blindfold. This and the previous entry written after migraine has passed.

Jan 30
12:04

Unravelling another flower, the one in the bottom right corner next to the leaves. Essential oils seem to have evaporated ~~because~~ all I can smell is the paper and textile. Have decided that I prefer not only the look but the feel of the intact crocheted portions.

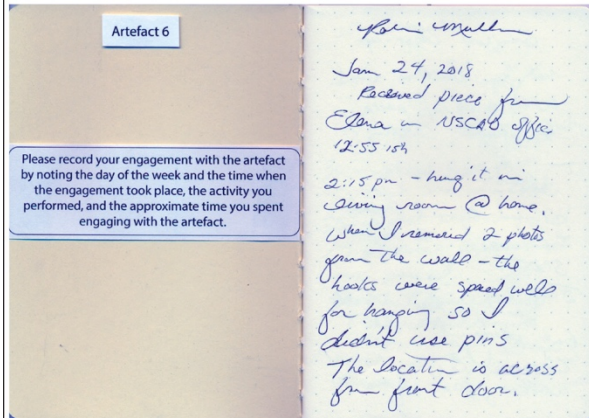
Pages 6-7

Feb 02, 18
23:12

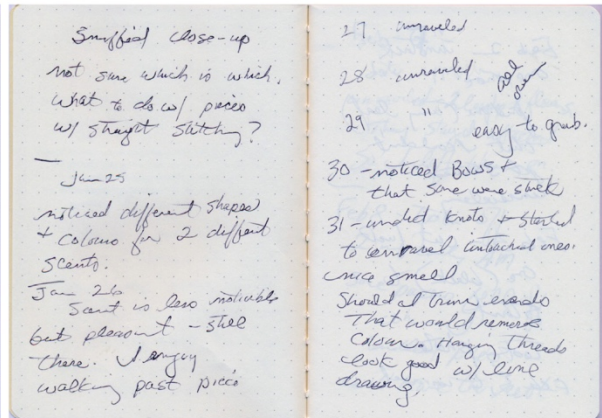
I have unravelled 6 more flowers/leaves, though more out of obligation because the 2 weeks is up. I cleaned my desk after realizing it was a barrier, but overall I think that my favourite interactions were visual, and the tactility of handling the crocheted portions. I might have unravelled more, I think, if I had time to re-attach them or to add something new of my own. There were a few knots in these flowers. I untied all but the ones in the palest coloured flowers, which I decided to cut after becoming frustrated. I am not sure whether I made the knots or if they were intentionally placed. This is a slippery type of thread, so I ~~wasn't~~ am inclined to suspect the latter. It is an interesting thought...

Pages 8-9

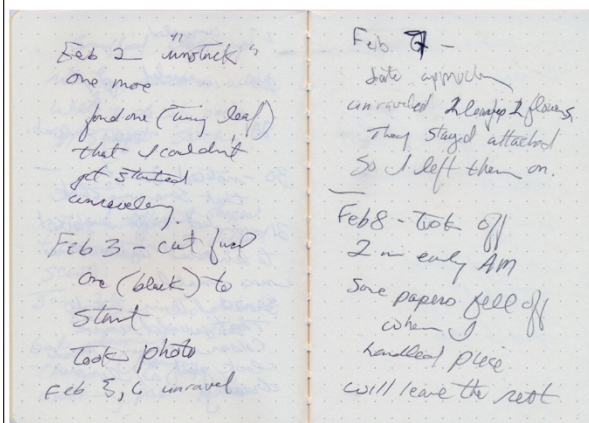
S 2.6 Journal for Artefact 2.6 (Nest Engagement)



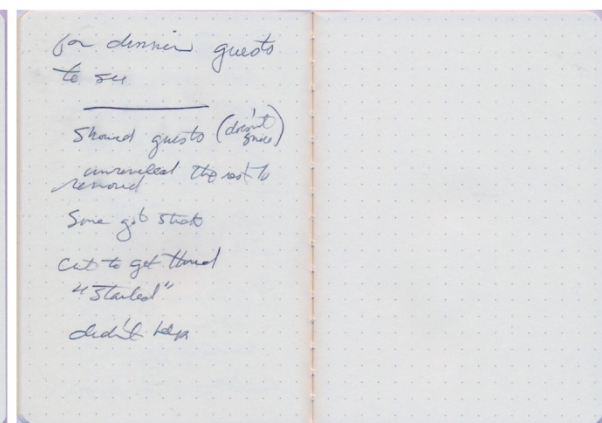
Page 1



Pages 2-3



Pages 4-5



Pages 6-7

T 1 Digital photographs from the first adoption experiment



T 1 Digital photographs from the second adoption experiment



Appendix U – Analysis of Data from Adoption Experiments

U 1 AE1 Data Analysis for the first adoption experiment

U 1.1 Sample of data reduction from interviews in the first adoption experiment

Questions asked	Participant responses
Where in the home did you place the artefact, and why did you decide to place it there?	<p>P1.1: I put it in <u>my bedroom</u> because, it is the only place where I have a little bit of white space. Because everything is full with books, and pictures and frames. It was <u>a practical reason</u>.</p> <p>P1.2: We decided to place it <u>where it would fit</u>, so that was our criteria for this decision because it was quite large, <u>so we put it in the living room</u>, in the biggest wall we have in the living room, that was a wall that did not have anything on it. It was really a <u>matter of space</u>. We also considered the corridor, but then I thought we couldn't engage with it visually, so our living room is a big space with lots of light so we thought it would be better to put it there where we have to look at it more often than the corridor, which is a passage place. Those were the only two places where it would fit.</p> <p>P1.3: I put it in my <u>bedroom</u>. On a blank wall in my bedroom just <u>because I was the one doing it and interacting with it so I thought it should go in my room</u>. If it was in the kitchen or in the living room I did not want it to fall down, so it was just easy for me to put it there. In this way, I could do it in the evening or whenever I wanted to do it.</p>
Do you think the placing affected the way you interacted with the artefact? How?	<p>P1.1: Yes. I don't come very often to my room. I come to sleep and then I leave and I never come back during the day. So, <u>probably I would have engaged with it very little. If I had it in the living room, probably there would have been a little bit of interaction</u>. Maybe managing a few things or smelling to see if it still has a smell.</p> <p>P1.2: Yes, it definitely did affect it <u>because we spent most our time during the day in the living room</u>, so it was actually in the room where we spend most time. I think if it was in the corridor, although we might smell it, it wouldn't be something that we would engage with so much, because we just pass there while we are going to the kitchen and back towards the living room, or to the toilet and back towards the living room. So, at least visually, we had the time to engage with it quite often because we spend a lot of time at home, and a lot of time in the living room.</p> <p>P1.3: Yes. I think it <u>made me interact with it more in the evening</u>. Just before I went to bed I would interact with it, whereas if it was somewhere else in the house I would do it more in the day. So, I think it changed when I interacted with it not necessary how. Just when.</p>
For how long and how often did you interact with the artefact?	<p>P1.1: I think it was a couple of hours, more or less.</p> <p>P1.2: I think that we engaged with it <u>when we put it up on the wall</u>, and at that time <u>I decided we would put just one flower up</u> because I am very sensitive to smells, and I thought 'oh my god this might be really strong' and I get all these allergies and headaches, and so maybe we just put one flower up. So, we tried that and it was very discrete smell, so I thought that it would be perfectly safe. I don't know how many days after (that would be in the log I think), but I think <u>three or four days after I decided to put other flowers up and I put all the other flowers up</u>. I have to say that, we encountered a couple of technical issues, so, we decided to replace the threads. Instead of placing the flowers with the thread we just pinned them. Because we thought it was very complicated to do it with the thread. So, we just pinned them in the places that we thought were right for them, and so by that time we had all the flowers in place, so the smell was not as strong as I thought it would be because I was scared initially that it's going to be very strong smell and I am going to have headaches, and it was not at all like that. It's very subtle smell, so I think that after that we kind of engaged sometimes just by passing by and smell it closer but not very often. So, it kind of blended in with our home scape. So, it became part of it in a way that, it kind of disappeared. When we would sit on the sofa we would look at it and engage with it visually, but other than that it kind of became part of our home and we kind of forgot about it.</p> <p>P1.3: Each time <u>I probably interacted it for about a couple of minutes</u> and it would mostly be in the evening or in the weekend. There were days when I did not interact with it at all. But generally, a couple of minutes. There were periods when I did not interact with it, like a few days.</p>

U 1.2 First adoption experiment journals data reduction

Colour coding explained:

Yellow – reference to other ways of engaging

Teal – reference to other roles of the artefacts

Skin – reference to the interactions

Orange – reference to the scent

Aspects investigated	P 1.1	P 1.2	P 1.3
How often did they engage (actively interacted) with the artefacts?	1 time	2 times	6 times
For how long in average they engaged with the artefacts?	Around 2 hours	6 minutes the first time. No records about the second time	1 minute up to 10 minutes each time.
What day of the week + What time of day they engaged with the artefact? Morning 6:00AM – 11:59AM Afternoon 12:00PM – 5:59PM Evening 6:00PM – 11:59PM Night 12:00AM – 6:59PM	1x Saturday afternoon	1x Thursday morning 1x Sunday evening	2x Monday afternoon 3x Tuesday evening (twice in one day) 1x Wednesday evening
How often did they engage (through the sense of sight/touch (no interaction) /smell) with the artefact?	No records about this type of engagement	1 time	1 time
How did they describe the engagement with the artefact? (excerpts from the journals to reflect the aspects of the artefacts addressed)	<i>I have started with the big ones, the pepper mint leaves. Maybe because they are big and look easier to begin with.</i> <i>While I am doing this, I am not thinking of anything else (work, PhD).</i> <i>I am enjoying the craft, the amount of work to create the patterns.</i> <i>I can smell lavender coming from (to?) the kitchen.</i>	<i>I found the threads hard to handle when hanging the pepper mint elements with scent.</i> <i>Added the other flowers to see if the smell is intensified.</i> <i>Added them (the flowers) using pins and not the strings/threads provided.</i>	<i>I put the piece up near my bed and examined the detail. It's beautiful!</i> <i>Pulled another flower [...] Noted I couldn't smell much Lavender oil though.</i> <i>The thread got stuck, so I have up [...] I'll probably try again though.</i>

U 1.3 First adoption experiment interviews + journals data display

Aspects investigated	Participant responses
<p>The potential that these repetitive actions have in generating a new domestic ritual by looking at:</p> <ul style="list-style-type: none"> - The placement of artefacts in the home 	<p>P1.1 placed the artefact in their room (i.e., bedroom) because they share the home space so they thought it was most appropriate as they were the person interacting with the artefact.</p> <p>The placement of the artefact for P 1.2 was dictated by (a) wherever it would fit (i.e., living room or corridor) and (b) by which out of the two spaces it would fit in would allow for more engagement with the artefact, and that was the living room because <i>'it is a big space with lots of light'</i> and would allow to <i>'look at it more often than the corridor which is a passage'</i>.</p> <p>P1.3 placed the artefact in their room (i.e., bedroom) because they both share the home space so they thought it was most appropriate as they were the person interacting with the artefact.</p>
<ul style="list-style-type: none"> - The repetitive nature of the engagement (as active participation) interviews data_____ <p>journals data_____</p>	<p>P 1.1 engaged with the artefact once in a block of time (in the last day the artefact was in their home) for <i>'a couple of hours'</i>.</p> <p>P 1.2 engaged with it twice: once when they put it up on the wall, and the second time <i>'three or four days later'</i>. They also mentioned they engaged with it visually and by smelling it many times throughout the two weeks.</p> <p>P 1.3 engaged with it consistently (i.e., six times) throughout the two weeks for a couple of minutes each time.</p> <p>P 1.1 engaged with the artefact 1 time for about 2 hours.</p> <p>P 1.2 engaged with the artefact 2 times for about 6 minutes.</p> <p>P 1.3 engaged with it 6 times: three times from 1 minutes to 10 minutes in average.</p>
<ul style="list-style-type: none"> - The day of the week and the time of the day the engagement took place interviews data_____ <p>journals data_____</p>	<p>P 1.1 engaged with it on Saturday afternoon.</p> <p>P 1.2 engaged with it around meal time (because that was the time when they were not working, and because that was the time when they would pass by the artefact more often): <i>'end of the morning or late afternoon'</i>.</p> <p>P 1.3 engaged with it <i>'generally'</i> in the evening, that is <i>'when I came home after work and just as I was going to bed'</i>.</p> <p>P 1.1 engaged one time on Saturday afternoon for about 2 hours.</p> <p>P 1.2 engaged one time on Sunday evening and one time on Thursday morning.</p> <p>P 1.3 engaged three times on Tuesday evening, twice on Monday afternoon and one time on Wednesday evening.</p>
<ul style="list-style-type: none"> - The intention behind stopping to engage with the artefact 	<p>For P 1.1 the engagement with the artefacts was <i>'planned'</i> to happen on a particular day at a particular time (<i>'It wasn't spontaneous. It was planned.'</i>)</p> <p>For P 1.2 the engagement with the artefact was <i>'mostly guided by the times we were not working'</i> (i.e., around meal times).</p> <p>P 1.3 the decision to engage with the artefact was spontaneous <i>'I feel like doing it tonight so I will. It wasn't like "oh, I don't feel like</i></p>

<ul style="list-style-type: none"> - Journals data with regards to other participations (engaging though the sense of sight, smell, touch [without doing the interactions]) 	<p><i>doing it but I have to". It was like I wanted to do it. I think it was one time when I did like four because I fancied doing it, pulling off four pieces at one time'.</i></p> <p>P 1.1 engaged with it visually during the two hours they actively interacted with it (<i>'I am enjoying the craft, the amount of work to create the patterns'</i>).</p> <p>P 1.3 mentioned they engaged with it visually 1 time (<i>'I put the piece near my bed and examined the detail. It's beautiful!'</i>)</p>
<p>The role of bio-inspiration in generating a ritualistic behaviour by looking at the role of:</p> <ul style="list-style-type: none"> - The bird story in relation to the behaviour - The essential oils in relation to the behaviour - The craft qualities of the artefact in relation to the behaviour - The craft qualities of the packaging in relation to the behaviour 	<p>P1.1 wondered what is the connection of the artefact with the bird story (<i>'I wondered why do I have two options. Am a I like a bird and I have to know which one should I choose?'</i>)</p> <p>P1.2 also questioned the relation between the two. They went on creating a parallel between the role of plants in the nest and the artefact in the home (<i>'if it's for a nest, maybe we would have all walls covered in it [...] maybe (the artefact) would have to be something that would cover all our walls'</i>)</p> <p>P1.3 read it when opening the package for the first time, but did not pay attention to it for the remaining of the time they had the artefact.</p> <p>P1.1 did not see any connection between the use of oils and the bird behaviour.</p> <p>P1.2 even though not sure of what the oils did, created a parallel between the use of aromatic plants by the bird and the use of essential oils, and they questioned if the oils were intended to work in a similar way to the aromatic plants (<i>'we assumed that they will have some kind of beneficial effect on us but we didn't know what it was'</i>).</p> <p>P1.3 was excited about the engagement with the artefact because of the use of essential oils (<i>'it was quite exciting to pull it off thinking 'Oh, I am going to smell this now'</i>), but they did not make any connection between the use of oils and the bird behaviour.</p> <p>P1.1 said the artefact fitted well in their room.</p> <p>P1.2 said the artefact is <i>'calming and relaxing maybe because of the colours, the use of very light colours'</i>.</p> <p>P1.3 said it was <i>'nice having that aspects of outdoors and nature inside'</i>.</p> <p>P1.1 said the packaging made the artefact seem like <i>'a little present'</i>.</p> <p>P1.2 said <i>'the materials indicated what you were going to receive',</i> and that the packaging <i>'puts you in a certain mood, because you feel that is delicate and it is something that was carefully packaged so that sense extrapolates to the activity. It makes you think it should be carefully done and that is something precious'</i>.</p> <p>P1.3 said opening it up it was like <i>'opening up a little present'</i>.</p>

<p>The potential that engaging in the bio-inspired ritualistic behaviour has in raising awareness about the home environment with a focus on its health (i.e., air quality).</p>	<p>P1.1 said no actions/thoughts occurred as a result of interacting with the artefact. In addition, they had no concerns about mould and fumes in the home, and have a general awareness of dust, ventilation and the use of paints and varnishes in the home.</p> <p>P1.2 said that interacting with the artefact gave them a feeling of <i>'harmony'</i>. They showed awareness of the health of the home environment by thinking more about the fumes produced while cooking (<i>'maybe I reflected more on it because I had to think about scent'</i>). They also realized how dusty their home (<i>'when we took your piece down, it was completely covered with dust on its back [...] we said "oh my god, we totally don't clean our house! We have so much dust!" And we had to clean up your piece because it was completely, I mean really full of dust'</i>).</p> <p>P1.3 showed awareness in relation to the home environment, saying they were <i>'more mindful of the environment in the sense that I was paying attention if things needed to be done. I was aware that the object (artefact) was there and that was something I could interact with. I became more aware of my surroundings. Of what needed to be done. I was aware that it was in my room and I needed to go to it to do something'</i>. Having an object that I could engage with <i>'made me more interested in what was going on in the rest of the house, like "that needs washing, that needs hoovering"</i>, and they paid <i>'quite a bit more attention'</i> to the level of dust in their home, for the same reason <i>'I was just more aware of it because I was aware that I was interacting with a piece of furniture or piece of art in my house so I was just thinking "okay, I am more aware of my surroundings, of my other furniture"'</i>.</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>The design of artefacts in relation to their:</p> <ul style="list-style-type: none"> - Scale - Installation - The design of interactions interviews data _____ 	<p>P1.1 said the artefact was <i>'a bit big for a small house full of books'</i>.</p> <p>P1.2 said the artefact was <i>'quite large'</i>, which was an issue because it was <i>'hard'</i> to find a spot to put it up.</p> <p>P1.3 said the scale of Nest Engagement was <i>'good'</i>.</p> <p>P1.1 said that installing the artefact was <i>'clever'</i>, but they couldn't use the nails because they <i>'got completely bent'</i>.</p> <p>P1.2 said that installing the artefact was <i>'very complicated'</i> because the pins would fold, when trying to hammer them into the stiff walls.</p> <p>P1.3 said that installing Nest Engagement was <i>'really easy'</i> because <i>'it was just easy to hammer [the really small pins] into the wall'</i> and because the artefact was so light that it could <i>'easily hang on the two pins'</i>.</p> <p>Note: the same installation system was incorporated in the design of the three artefacts.</p> <p>P1.1 mentioned about the first activity in Home Pharmacy (identifying where the loose fragments go) that it was <i>'difficult'</i> until one realizes it is like a puzzle. The second activity (placing the loose fragments in their corresponding place) was <i>'easy'</i> after discovering the piece is like a puzzle.</p> <p>P 1.2 said about the first two activities in Remedial Landscape (opening up the fragments by unraveling crochet and unstitching) that they were <i>'okay'</i> and that the way it was put together is <i>'very smart [...] very simple and easy enough, and common enough for other people to know how to do it [...] because it happens to everyone,</i></p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>journals data_____</p> <p>- The scents interviews data_____</p> <p>journals data_____</p>	<p><i>at some point your clothes fall apart with the thread coming out so that is something I am sure everyone is familiar with</i>. The third activity (tying up the loose fragments to the panel using the threads attached to the fragments and the panel or <i>'the thing you had to do with the threads was a bit complicated, and sometimes the threads would break too'</i>) was seen as <i>'a bit too demanding', 'really complicated'</i> and it took <i>'much time'</i>. For that reason, they came up with an alternative, that is putting the fragments up with pins.</p> <p>P1.3 said about the activity in Nest Engagement that it was <i>'straightforward'</i>, but they wished there were larger fragments that could take longer to unravel.</p> <p>Both Remedial Landscape and Nest Engagement had technical issues, that is the thread broke while handling it.</p> <p>P 1.1: <i>'I've started with the big ones, the pepper mint leaves. Maybe because they are big and look easier to begin with.'</i></p> <p>P1.2: <i>'I found the threads hard to handle when hanging the pepper mint elements with scent [...] I added them (loose fragments) with pins and not the strings/threads provided.'</i></p> <p>P1.3: <i>'The thread got stuck so I gave up. I'll probably try again though.'</i></p> <p>P1.1: <i>'At the beginning, it was nice. At some point, it was a little bit too much.'</i></p> <p>P1.2: <i>'They were very pleasant. They are subtle scents.'</i></p> <p>P1.3: <i>'I couldn't smell them that much. I don't know if they faded or something else.'</i></p> <p>P1.1: <i>'I can smell the lavender coming from (to?) the kitchen.'</i></p> <p>P1.2: <i>'Added the other flowers to see if the smell is intensified.'</i></p> <p>P1.3: <i>'Pulled another flower [...] Noted I couldn't smell much Lavender oil though.'</i></p>
<p>The additional roles of the artefacts interviews data_____</p> <p>journals data_____</p>	<p>P1.1 said the artefact (that is a <i>'wall poster puzzle, related to nature and scents'</i>) could help <i>'someone with stress [...] because while you are doing this, you are not thinking of anything else'</i>. They referred to the overall experience as <i>'a bit exciting'</i>.</p> <p>P1.2 said the artefact (that is a <i>'painting that you could smell'</i>) was <i>'very nice to look at'</i> and <i>'would distract me from other things in my life. The fact that it has those shapes, that were more sort of abstract it would made want to try to find something about them, try to figure out what they were. You know, it's like when you cloud watch'</i>. P1.2 also said the engagement with the artefact was <i>'sensorial'</i>, because they could engage with it using their sense of sight and smell. They referred to the overall experience as generating a <i>peaceful state of mind and calming</i>.</p> <p>P1.3 said the artefact <i>'could be nice for people who are busy [...] because it will give them a chance to interact with their home and be aware of their surroundings [...] and a bit of time out, even if it just to spend a few minutes with it here and there'</i>. The experience have them <i>'a general positive mood'</i>.</p> <p>P1.1: <i>'While I am doing this, I am not thinking of anything else (work, PhD, etc.).'</i></p>

<p>The application of the adoption method</p>	<p>P1.1 said they don't remember what they thought of the project when they read the Participant Information sheet.</p> <p>P1.2 said they were pleasantly surprised by the look of the artefact, because they had seen a previous artefact and assumed this one will be the same.</p> <p>P1.2 thought the Participant Information Sheet offered enough information to the participants and an accurate description of the artefact and of what they were asked to do.</p>
-----------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

U 2 AE2 Data Analysis for the second adoption experiment

U 2.1 Sample of data reduction from interviews in the second adoption experiment

Questions asked	Participant responses
Where in the home did you place the artefact, and why did you decide to place it there?	<p>P2.1: I ended up putting it in <u>my living room</u>, on the bigger wall, because it was bigger than the other place I have mentioned to you before, and also <u>because that is the room that we live in the most</u>. So, I thought with the pepper mint it might be really nice to infuse that room with it and also, spend time with the artwork.</p> <p>P2.2: I placed it in <u>my living room</u>, <u>because it is the room in my house where I spend probably the most time when I am not sleeping and I have wall space in my living room</u>. It is like a hub of the house. When I walk in the front door the living room is the room that you walked into. So, I felt that it would be the space where I would probably interact with the artefact the most.</p> <p>P2.3: I put it in the <u>bedroom</u> <u>because I was thinking that the lavender would have a soothing effect on sleeping habits</u>, so I imagined myself drifting away in the lavender scent. And the mint would freshen it up, freshen the air.</p> <p>P2.4: I live in a loft apartment and I have a <u>bedroom</u> that is right above my living room. I have a really nice <u>beam that goes right in front of my bed but looks down into the living room so I hung it right there</u> for the entire two weeks. I did however switch it part way through. I had it facing my bedroom for a while and then I thought that it could be nice if I could see it from the living room. So, I switched it around just to see what the difference would be and also to look at it from different perspectives.</p> <p>P2.5: I put it just <u>above my desk</u>, and one of the reasons was that, <u>that is the space I look at quite frequently and I wanted to interact with the piece. It is also visible from my bed, so I could see it at times when I am just relaxing as well. And, obviously if I am working at my desk it's right there, in front of me.</u></p> <p>P2.6: I <u>placed it right where you see it as you come in through the front door. I did walk by it all the time, when I was going to the basement, I walked by it many, many times per day. I was going to move it at some point over by the sofa, because I thought that is where I sit and work on my computer, and I thought I tried it both ways, but I liked where it was and it was easy to reach to unravel it, which I am realizing may not be what I was supposed to do, but that is what I did. I liked walking by it. And I also thought that if it was by the sofa, I had to climb over a table and a lamp to get to it. And also, I put it there because I had things hanging on the wall already and somehow the hooks were spaced really well, so I didn't have to make a decision about putting it up leveled or anything like that. I just used the hooks that were already there.</u></p>
Do you think the placing affected the way you interacted with the artefact? How?	<p>P2.1: Definitely I am happy that I put it in the living room because <u>I could actually look at it, as an actual artwork not just work to be done that is visited ever so often</u>. So, I was happy that I chose to put it in the living room after all. I could only choose that once I saw the work, because I did not know what to anticipate exactly. So, <u>having it in the living room allowed me not to just actively interact with it but also passively, which I found really enjoyable.</u></p> <p>P2.2: I would see it multiple times a day. The living room is the place where I come home from work, I often eat dinner in the space, I relax in that space, I do work in that space, so even if I wasn't directly touching the artefact or doing work with the paper pieces, I would be able to glance over to the artefact. <u>I would be involved with it in a less deliberate way.</u></p> <p>P2.3: <u>Every day, it was the last thing and the first thing I saw. So, seeing it was a nice start of the day.</u> Also, I saw it when I fell asleep, because it was just across from my bed. And I wished there would be more interactions. I was disappointed that there were only six fragments. I would have liked to have this as a daily ritual.</p> <p>R: I mentioned the word engaging. So, when you think of engagement what do you think of exactly?</p> <p>P2.3: Engagement is contemplating it. I always have a cup of tea in bed before I get up. So, I look out of the window at the moon or the stars, or the trees outside, and the piece was next to it, so it is just a nice way to step into your day by contemplating something beautiful.</p>

U 2.2 Second adoption experiment journals data reduction

Colour coding explained:

Yellow – reference to other ways of engaging

Teal – reference to other roles of the artefacts

Skin – reference to the interactions

Orange – reference to the scent

Aspects investigated	P 2.1	P 2.2	P 2.3	P 2.4	P 2.5	P 2.6
How often did they engage (actively interacted) with the artefacts?	5 times	6 times	5 times	10 times	4 times	9 times
For how long in average they engaged with the artefacts?	10 minutes up to 30 minutes each time.	30 minutes each time.	5 minutes up to 30 minutes each time.	1 minute up to 10 minutes each time.	No records about the length of engagement.	No records about the length of engagement.
What day of the week + What time of day they engaged with the artefact? Morning 6:00AM – 11:59AM Afternoon 12:00PM – 5:59PM Evening 6:00PM – 11:59PM Night 12:00AM – 6:59PM	1x Monday morning / evening 1x Wednesday afternoon 1x Thursday morning 1x Friday afternoon	1x Tuesday evening 1x Wednesday evening 1x Thursday evening 1x Friday evening 1x Saturday morning 1x Sunday afternoon	1x Monday evening 2x Saturday morning 1x Sunday morning/ evening	1x Monday morning/ evening 1x Friday evening 1x Saturday morning/ afternoon/ evening 1x Sunday morning/ afternoon/ evening/ night	1x Monday afternoon 1x Tuesday afternoon 1x Friday evening 1x Saturday morning	2x Monday ? 1x Tuesday ? 2x Wednesday ? 1x Friday ? 2x Saturday ? 1x Sunday ?
How often did they engage (through the sense of sight/touch (no interaction) /smell) with the artefact?	3 times	1 time	1 time	32 times	8 times	3 times
How did they describe the engagement with the artefact? (excerpts from the journals to reflect the aspects of the artefacts addressed)	<i>The few spots of green in it how are lovely...</i> <i>The many-layered effect is really soothing + also holds my gaze.</i> <i>I flipped the artefact backwards on the wall and placed 2 more leaves into the slots.</i> <i>The slots are hard to find.</i> <i>I developed a bad flu over the weekend and the pepper mint smell feels great.</i> <i>I found the artefact very easy to look at for periods of time, almost more soothing than the aromatherapy.</i>	<i>The care that was taken to create this beautiful series of envelopes encourages me to treat the artefact with extra care.</i> <i>I've looked at the artefact but have not added any more scented pieces.</i> <i>I didn't notice its (the artefact's) fragrance and neither did she.</i> <i>I added the small pepper mint piece.</i>	<i>Lifting the layers carefully, getting closer to the beautiful scents, reading the instructions was like opening a mystery, a secret, and felt very special and ceremonial.</i> <i>The scent in my bedroom is subtle, not overpowering and I am looking forward to my sleep tonight.</i> <i>I enjoyed unravelling the thread to release the fragment.</i> <i>Delicate, exquisite piece.</i>	<i>I picked it up, smelled the lavender and placed it in the envelope.</i> <i>I looked at the piece and noticed how different it looks at night.</i> <i>*I touch the four paper petals that have been unravelled.</i> <i>I carefully unravel the petal that has the tight crochet.</i> <i>It opened up my mind to the possibility of incorporating aromatherapy into my home.</i>	<i>Unwrapping the artefact had a ritual feel. The delicate materials and multiple fastenings made me respond with gentleness.</i> <i>I enjoyed feeling the different textures while unwrapping the piece.</i> <i>I enjoy the main fabric's transparency.</i> <i>The layers of both texture and information were both fun and calming.</i> <i>The act of hanging it and the finished look inspired me to clean up all the stacked books and papers on the desk surface.</i> <i>I spent a few minutes looking at it when I felt stressed.</i> <i>Essential oils seem to have evaporated.</i> <i>I might have unravelled more, if I had time to re-attach them to add something new of my own.</i> <i>There were a few knots in these flowers.</i>	<i>Noticed different shapes and colors for 2 different scents</i> <i>Scent is less noticeable, but pleasant – still there.</i> <i>'Unstuck' one more leaf that I couldn't get started unravelling.</i>

U 2.3 Second adoption experiment interviews + journals data display

Aspects investigated	Participant responses
<p>The potential that these repetitive actions have in generating a new domestic ritual by looking at:</p> <ul style="list-style-type: none"> - The placement of artefacts in the home <p>The repetitive nature of the engagement (as active participation) interviews data_____</p> <p>journals data_____</p> <ul style="list-style-type: none"> - The day of the week and the time of the day the engagement took place interviews data_____ 	<p>P2.1 placed it in the living room <i>because 'that is the room that we live in the most'</i> and by placing it there they were allowed <i>'not to just actively interact with it but also passively'</i>.</p> <p>P2.2 placed it in the living room and had the same reasoning for its placement as P2.1. P2.3 placed it in the bedroom because they thought that <i>'the lavender would have a soothing effect on sleeping habits'</i>.</p> <p>P2.4 placed it in an area between bedroom and living room and realized that <i>'when it was facing the bedroom it was a lot less formal environment' and they could 'see it at a much closer point'</i>.</p> <p>P2.5 placed it above their desk because <i>'that is the space I look at quite frequently and I wanted to interact with the piece. It is also visible from my bed, so I could see it at times when I am just relaxing. And obviously, if I am working at my desk it's right there, in front of me. It would get more interactions than another spot'</i>.</p> <p>P2.6 placed it <i>'right where you see it as you come in through the front door'</i>, because they would walk by it many times per day.</p> <p>P2.1 engaged with it <i>'almost every other day'</i> from 15 minutes to half an hour each time.</p> <p>P2.2 was in the same room with the artefact every day.</p> <p>P2.3 engaged with it the longest the time they first opened the package.</p> <p>P2.4 engaged with it every day <i>'in the morning a little bit and usually when I get home from work for a little bit and also usually before I was asleep [...] The first few days it was a lot about touching it, and physically engaging with it, by undoing the threads'</i>.</p> <p>P2.5 engaged with it most of the days <i>at least</i> by looking because <i>'it was right there waking up and going to sleep and spent a lot of time just touching the materials'</i>.</p> <p>P2.6 <i>'probably stopped and looked at it every time I walked by, so probably 5-6 times a day, but just unraveled only probably once a day'</i>.</p> <p>P2.1 engaged with it 5 times from 10 to 30 minutes each time.</p> <p>P2.2 engaged with it 6 times for about 30 minutes each time.</p> <p>P2.3 engaged with it 5 times from 5 to 10 minutes each time.</p> <p>P2.4 engaged with it 10 times from 1 to 10 minutes each time.</p> <p>P2.5 engaged with it 4 times.</p> <p>P2.6 engaged with it 9 times.</p> <p>P2.1 said <i>'there was no routine in the way they interacted with the artefact [...] sometimes it was in the evening and sometimes it was during the day'</i>.</p> <p>P2.2 said they interacted with it <i>'definitely'</i> in the evening.</p> <p>P2.3 mentioned the weekend and the evening (just before going to bed).</p> <p>P2.4 said <i>'a little bit of both'</i> (morning and evenings) and <i>'a lot more'</i> on the weekends.</p> <p>P2.5 engaged with it in the mornings and in the evenings.</p>

<p>journals data _____</p> <ul style="list-style-type: none"> - The intention behind stopping to engage with the artefact - Journals data with regards to other participations (engaging though the sense of sight, smell, touch [without doing the interactions]) 	<p>P2.6 engaged with it mostly in the evenings because they were <i>'marching around the house more'</i>.</p> <p>P2.1 engaged with it on weekdays only: twice in the morning, twice in the afternoon and once in the evening.</p> <p>P2.2 engaged with it four weekdays in the evening, and once on Saturday morning and once on Sunday afternoon.</p> <p>P2.3 engaged with it mostly in the weekends: twice on Saturday morning, once on Sunday morning and once on Sunday afternoon, and once on Monday evening.</p> <p>P2.4 engaged with it mostly in the weekends: on Saturday morning, afternoon and evening, on Sunday morning, afternoon, evening and night, and on weekdays on Monday and Friday evening and Monday morning as well.</p> <p>P2.5 engaged with it mostly on weekdays (Monday and Tuesday afternoon, Friday evening) and on Saturday morning.</p> <p>P2.6 engaged with it weekdays (twice on Monday and Wednesday, once on Tuesday and Fridays) and weekends (twice on Saturday and once on Sunday).</p> <p>All participants interacted with the artefact spontaneously, and the engagement with the artefact was triggered by their presence in the space where the artefact was.</p> <p>P 2.1 mentioned 3 times they engaged with it visually (<i>'the few spots of green in it how are lovely'</i>)</p> <p>P 2.2 mentioned 1 time they engaged with it visually (<i>'I've looked at the artefact, but have not added any more scented pieces'</i>). Other than that, they mentioned they were in the same room with the artefact.</p> <p>P 2.3 mentioned 1 time they engaged with it visually (<i>'the delicate, exquisite piece'</i>)</p> <p>P 2.4 mentioned 32 times they engaged with it visually (<i>'I looked at the piece and noticed how different it looks at night'</i>) and through the sense of touch (<i>'I touch the four petals that have been unravelled'</i>)</p> <p>P 2.5 mentioned 8 times they engaged with it visually (<i>'I enjoy the main fabric's transparency'</i>) and through the sense of touch (<i>'I enjoyed feeling the different textures while unwrapping the piece'</i>).</p> <p>P 2.6 mentioned 3 times they engaged with it visually (<i>'noticed different shapes and colours for 2 different scents'</i>).</p>
<p>The role of bio-inspiration in generating a ritualistic behaviour by looking at the role of:</p> <ul style="list-style-type: none"> - The bird story in relation to the behaviour 	<p>Helped P 2.1 understand why I have chosen the engagement (<i>'I had that [the story] in my mind even though we are obviously not nurturing birds, but it felt like I was doing the same thing for our home environment'</i>).</p> <p>Straightened the connection with nature in P 2.2's mind and made them <i>'feel like whatever I was doing with this artifact was very natural, healthy, good for me'</i>. It made them think that <i>'the act of making your house feel calm and nicely fragranced is actually very natural, we see it in nature, and therefore it's okay if you are doing this yourself'</i>.</p> <p>Made P 2.3 feel more connected with nature and to realize <i>'I should work harder to improve the quality of my home'</i> because they just had to open up a package, while the little bird probably had to work hard to acquire the plants for its nest. It also made them think that because of the oils maybe <i>'anything bad that there is here (the bedroom) will be absorbed in these fragments'</i>.</p> <p>They compared the artefact with a plant which purifies the air.</p> <p>Made P 2.4 wonder if the artefact was <i>'detoxifying'</i> the home.</p>

<ul style="list-style-type: none"> - The essential oils in relation to the behaviour - The craft qualities of the artefacts in relation to the behaviour - The craft qualities of the packaging in relation to the behaviour interviews data_____ journals data_____ 	<p>Made P 2.5 created the parallel between their behaviour and the nest behaviour and said they felt <i>'quite special to even have the idea that I was doing something similar'</i> to what the bird was doing.</p> <p>Made P 2.6 wonder if the artefact was <i>'purifying'</i> the house.</p> <p>P 2.1 found the presence of oils <i>'comforting'</i>.</p> <p>P 2.2 <i>'liked the idea of thinking that maybe it was some kind of purification in my 'nest', if I was the blue tit'</i>.</p> <p>P 2.3 thought it allowed for a <i>'beautiful olfactory experience'</i>.</p> <p>P 2.4 was intrigued about the presence of oils in the piece, and appreciated the fact it brought <i>'another element to the piece, not just visual but it was also like using another sense'</i>.</p> <p>P 2.5 was also pleasantly surprised and said <i>'you don't really think that something in your home that you interact with will smell when you open something (in a good way)'</i>.</p> <p>P 2.6 said it was a <i>'really nice sensation'</i>.</p> <p>P2.1 was reminded of <i>'a small green screened garden or mini garden or mini green-house effect, because of the translucency'</i>.</p> <p>P2.2 was reminded of the Queen Anne's lace flower.</p> <p>P2.3 said it made them think of an underwater scene.</p> <p>P2.4 was reminded of flowers, and also the pile of threads upon unraveling the fragments made them think of the bird's nest.</p> <p>P2.5 thought of the fields at the farm where their parents worked.</p> <p>P2.6 thought is <i>'a nice print'</i>.</p> <p>P2.1 said it was <i>'inviting'</i> and <i>'unfolded the project right in front of you'</i> as one had to take the time to open up each envelope to release the loose fragment.</p> <p>P2.1, P2.2, P2.3, P2.4 and P 2.5 said it made everything seem <i>thoughtful</i>, which in turn promoted participants to be <i>thoughtful</i> and <i>careful</i> with it</p> <p>P2.2: <i>'I could imagine you having to take initially a lot of time to create this packaging which made me have a different kind of reverence for the packaging and what was inside of it. I felt like you had taken time so I need to care about it as well'</i>.</p> <p>P 2.2 mentioned there was something <i>'really nice about the ritual of opening this special little packet and then popping it into the pocket [...] the ritual of unwrapping those little pieces'</i>. Where ritual means <i>'the act of slowing down and slowly opening each of these little paper pouches and deciding to put it somewhere and doing that every few days.'</i></p> <p>P 2.6 said the packaging was <i>'beautifully designed and made with care'</i> and it <i>'enhanced the experience'</i>.</p> <p>Both, the delicate materials that were used for the packaging and the way it was designed, stimulated these responses from the participants (<i>I thought it had a ritual element to it because of all those layers and the delicate materials</i> [P2.5]).</p> <p>P 2.2: <i>The care that was taken to create this beautiful series of envelopes encourages me to treat the artefact with extra care.</i></p> <p>P 2.3: <i>Lifting the layers carefully, getting closer to the beautiful scents, reading the instructions was like opening a mystery, a secret, and felt very special and ceremonial.</i></p> <p>P 2.5: <i>Unwrapping the artefact had a ritual feel. The delicate materials and multiple fastenings made me respond with gentleness.</i></p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

The potential that engaging in the bio-inspired ritualistic behaviour has in raising awareness about the home environment with a focus on its health (i.e., air quality)

P 2.1 showed awareness about the home environment, in the sense that the presence and interaction with the artefact reminding them about the plants at home, so they thought *'I should water the plant now because that needs some attention as well'*. They thought about the plants mostly because they visually look alike to the artefact, and because they thought about the artefact as an object in the home that is not alive but needs engagement, in contrast with other objects in the home that need engagement because they are alive (i.e., plants). They said they are generally aware about the level of dust, the smells from cooking and the cleaning products they use.

P 2.2 mentioned that it made them engaged more with the space because *'there is something nice about having intentional acts that you need to do'*. P 2.2 were aware of their home in that they *'felt that they had this special thing'* in the house and that *'the rest of the room should reflect how special that thing felt'*, so they thought of cleaning their house and about incorporating essential oils into cleaning, arguing that *'I would rather put that kind of fragrance into the air in the home than something that is more chemical'*.

P 2.3 said it made them more aware of the home environment and it reinforced *'the importance of taking time to create an environment that is relaxing and rejuvenating'*. When P 2.3 was asked about the use of cleaning products in the home they said they thought about *'using less (cleaning products) and less abrasive, more gentle products'*, arguing that *'especially the lavender, but the peppermint too, are natural products and they freshen up the air, so why not apply that same principle to getting rid of dirt'*. They also thought about introducing scent into their home (*'I could just buy lavender essential oil and just put it on a piece of felt and put it on my night table'*).

P 2.4 said the artefact *'improves my engagement with my space because of its interactive nature'*. They were reminded that home is *'a place where I can engage with things'* because. They would like to try using more natural oils into the home and because they were thinking of different ways of brining *'the natural home into an indoor space'*, they *'actually did go out and bought some potting soil'*, with the goal to start plantings some flowers. Because of the engagement with the piece P 2.4 *'did pay quite a lot of attention to it (dust) in the last couple of weeks, especially in the bedroom because I was engaging with the piece there'*. They also thought *'quite a bit (about cooking smells), especially because of the story of the blue tit, and how they use the lavender to expel toxins or keep them out'*. Last in relation to using cleaning products in the home they thought about using natural cleaning products, and switching to using vinegar for cleaning.

P 2.5 said the engagement with the artefact opened their mind as to *'the purpose of things in the home'*. They saw the idea of the interactive work as *'healthy'*, because it would stop *'blocking the dissociation from their environment'* which they are prone to. It made them engage *'a little bit more'* with their home and thought of the possibility of interacting with other things in the house. They kept their space *'a lot cleaner'* and paid *'quite a bit of attention'* to the level of dust. *'The act of hanging it and the finished look inspired me to clean up all the stacked books and papers on the desk surface'* (journal data).

P 2.6 realized they could interact with other things in the house, because they had to think about the artefact, *'as opposed to other things in the home'* (that are there because they are *'attractive'*). They also questioned if they would need to bring *'big pots of lavender and mint'* into their home as an equivalent to the plants the bird brings into its nest (*'the bird brings plants into the nest and the nest is small, and the plants are small [...] should I be bringing something huge into the house, like big pots of lavender, big pots of mint?'*).

The design of artefacts in relation to their:	
<ul style="list-style-type: none"> - Scale - Installation - The design of interactions interviews data _____ 	<p>All participants said the scale was <i>easy</i>. P 2.3 said it was <i>perfect</i> because <i>'if it was bigger it would be difficult to find a spot for it. If it was smaller it wouldn't have a presence'</i>.</p> <p>All participants agreed that they were <i>easy</i> to display. P2.4 mentioned that <i>'it is a very versatile piece for displaying, because it can be displayed in a varied number of ways'</i>.</p> <p>P2.1 said that they did not treat it as <i>'a task-oriented from A to B'</i>, instead <i>'it was more about what happens between A and B, so I wanted to really experience it, as opposed to just follow the instructions, that is put leaves into the slots and have that be done. I actually wanted to have a sensory experience of the whole thing: touch the piece, smell the oils, look at the many layers of the artwork'</i>.</p> <p>P2.2 mentioned <i>'there is something nice about the time you take, you are being made to engage with it for that time period. It is not just spritzing somethings in the air, or quickly dropping a piece in'</i>. They suggested having longer interactions, in order to build an extra layer of engagement not necessarily difficulty (<i>'I could imagine the ritual of opening the little pieces being even more wonderful if there was more of that wonderment about the initial packaging involved. Like having packages within packages'</i>). They mentioned that the interactions do not require <i>'special skills'</i>, but they do require <i>'gentleness'</i>.</p> <p>P2.3 said it was <i>fun</i> and <i>satisfying</i>. They also wished they had options because <i>'sometimes you are really busy and you can't (engage for long), but for example on the weekends I would have been happy to spend a little more time'</i>.</p> <p>P2.4 considered it <i>'a really great way of engaging with the piece and also make it my own because it developed as I undid the threads. Making it my own in the sense that it will transform at my rate'</i>.</p> <p>P2.5 said it was <i>fun</i> and <i>cathartic</i>, because <i>'you were disassembling, with the knowledge that it changes the nature of whatever the object is, that you are taking something away'</i>. They also mentioned that they would like to add fragments to the panel (they had Nest Engagement which involved solely removing actions).</p> <p>P2.6 felt they could have unravelled more.</p> <p>P2.4, P2.5 and P2.6 mentioned they had some technical difficulties, because the thread got stuck when unravelling.</p>
journals data _____	<p>P 2.1 <i>'I flipped the artefact backwards on the wall and placed 2 more leaves into the slots [...] The slots are hard to find'</i>.</p> <p>P 2.2 <i>'I added the small pepper mint piece'</i>.</p> <p>P 2.3 <i>'I enjoyed unravelling the thread to release the fragment'</i></p> <p>P 2.4 <i>'I carefully unravel the petal that has the tight crochet'</i></p> <p>P 2.5 <i>'Unravelling the 3 leaves in the bottom right corner of the artefact [...] I might have unravelled more, if I had time to re-attach them to add something new of my own [...] There were a few knots in these flowers.'</i></p> <p>P 2.6 <i>'Unstuck' one more leaf that I couldn't get started unravelling.</i></p>
<ul style="list-style-type: none"> - The scents interviews data _____ 	<p>P2.1 said they <i>'could smell it when it was in front of me, but I could not smell it in the air'</i>.</p> <p>P2.2 thought the scent <i>'dissipated too quickly'</i>.</p> <p>P2.3 <i>'really liked'</i> the idea of the scent, but it has to be <i>'stronger'</i>.</p> <p>P2.5 found they <i>'evaporated quite quickly'</i>.</p> <p>P2.6 said it released <i>'a very faint scent'</i> in the room.</p>

journals data _____	<p>P2.1 <i>'developed a bad flu over the weekend and the pepper mint smell feels great'.</i></p> <p>P2.2 <i>'didn't notice its (the artefact's) fragrance'.</i></p> <p>P2.3 <i>'the scent in my bedroom is subtle, not overpowering and I am looking forward to my sleep tonight'.</i></p> <p>P2.4 <i>'picked it up, smelled the lavender and placed it in the envelope'.</i></p> <p>P2.5 mentioned <i>'the essential oils seem to have evaporated'.</i></p> <p>P2.6 said <i>'the scent is less noticeable, but pleasant – still there'.</i></p>
<p>The additional roles of the artefacts</p> <p>interviews data _____</p> <p>journals data _____</p>	<p>P2.1: <i>'wall-based artwork that is interactive, very pleasant and really soothing [...] it stimulated so many senses: tactile, visual, and also, olfactory, like aromatherapy. So, there is something really therapeutic'.</i></p> <p>P2.2: <i>'wall hung textile artwork [...] calming (with the colours that you used and the choice of materials)'.</i></p> <p>P2.3: <i>'beautiful piece of textile art [...] will make you calm and relaxed, that is for decoration, but also contemplation. Almost meditating, because I found the imagery was so soothing'.</i> In addition, it provides a sensory experience.</p> <p>P2.4: <i>'piece of art [...] functions as something to beautify the space and make it very relaxing and enjoyable'.</i></p> <p>P2.5 <i>'delicate and calming piece of art'</i>, and interacting with it was a <i>'lovely stress relief'</i>. It provides a sensory experience.</p> <p>P2.6 <i>'wall artwork'</i> that is <i>'meditative'</i> and <i>'therapeutic'</i> because it allowed one to <i>'just stop, just pause'</i> and <i>'rewarding'</i> because scents were released. It also provided a sensory experience. P 2.6 also argued the artefact is improving the home environment <i>'without having to be a hardship'</i> because it is so <i>beautiful</i>.</p> <p><i>Unwrapping</i> the artefact (i.e., opening the envelope, unravelling the threads) felt <i>ritualistic</i> (P 2.2) and it was mentioned as P 2.2, P 2.3, P 2.4, P 2.5, and P 2.6's favorite part of the experience.</p> <p>P 2.1: <i>'The many-layered effect is really soothing + also holds my gaze [...] I found the artefact very easy to look at for periods of time, almost more soothing than the aromatherapy'.</i></p> <p>P 2.4: <i>'It opened up my mind to the possibility of incorporating aromatherapy into my home'</i></p> <p>P 2.5: <i>'The layers of both texture and information were both fun and calming [...] I spent a few minutes looking at it when I felt stressed'.</i></p>
The application of the adoption method	<p>The Adoption Form heightened P 2.1's <i>'awareness about the value of the artefact'</i>,</p> <p>The lack of scale of the artefact on the Adoption Form made P2.1 and P2.2 think the artefact was much smaller than it actually was.</p> <p>What was written about the essential oils made P2.3 expect stronger scents.</p> <p>The photos on the Adoption Form peaked P2.4's interest in the research.</p> <p>When they received the artefact, P2.4 was surprised to discover <i>'the different parts of the piece: the petals and the threads'</i>.</p> <p>The photos on the Adoption Form also peaked P2.5's interest in the research.</p> <p>When they received the artefact, P2.5 was surprised with the delicacy of the artefact, and found a <i>'huge relief to see something so light, delicate, unexpectedly transparent, and very interesting with all those layers'</i>.</p> <p>The Adoption Form made P2.6 think they are part of something important.</p>

U 3 Data analysis for the follow-up interviews

U 3.1 Sample of data reduction from the follow-up interviews

Questions asked	Participants responses
How do you remember the experience of having the artefact in your home?	<p>P 2.2: I remember it as an overall <u>positive experience</u>, but also as a <u>very subtle experience</u>. Because it felt really unobtrusive in my home. I lived with it in my living room for a period of a few weeks. I don't remember how long, but it was <u>fun to interact with it</u> when the timing meant that I needed to do that.</p> <p>P 2.3: It was a <u>very pleasant experience</u>. I loved seeing it every day. It was in my bedroom, so I would see it in the morning and I would see it at night. It was a beautiful piece of art that I enjoyed.</p> <p>P 2.4: I remember it as a <u>very beneficial experience</u>, a <u>very positive one</u>. I think about it pretty often. I <u>engage with the space that in live in quite a bit</u>. I've been thinking about putting up more artwork in my space and more textiles. And, also <u>the role of nesting and how nesting in your own home affects your health and wellbeing</u>. I think having your artwork in my home was very positive, was good for my health to engage with the work and the different layers, the oils, the paper, the actual actions of undoing the crochets. It was <u>nice to engage with an object like that</u>.</p> <p>P 2.5: I remember that: number 1 it filled the space on my wall and <u>made a whole area of my home much more beautiful</u>. And, I also (probably my memories are mainly tactile), definitely enjoyed handling the piece, and interacting with it. I also feel that the colour scheme has been unconsciously integrated into my home now, a little bit. I wasn't expecting that but it is quite nice. Until I get tired of those colours I'll probably keep them. Definitely, into my artwork as well, the whole concept of layering that I spoke of last time. I have always thought of as philosophy and ideas being layered, but I never really unconsciously realized how drawn I am to layers in the physical form, and after experiencing that experiment I was much more conscious of that. And, I incorporated it quite heavily into my own work and I still do. As a child and as a younger person I did layered things but again it was unconsciously, and I became conscious after that. Very interesting.</p> <p>R: So, if you were to give a description to how the experience was, how would you sum it up?</p> <p>P 2.5: I would describe it as <u>different</u>. <u>People don't generally ask you to interact with objects in those ways</u>. So, that was <u>new</u> to me. And, <u>much more intimate that I am used to</u>. Especially in North America where we are thought to throw things away all the time. I felt I had <u>more compassion for the piece and compassion for inanimate objects in general</u>, which maybe I wouldn't have really thought about before. So, the experience was much more intimate than I would have guessed, even though I know it is kind of data driven for you. For me it felt <u>very personal</u>.</p> <p>R: Why compassionate?</p> <p>P 2.5: I think part of it had to do with the fact that the backing of it, <u>the substrate was very delicate</u>. I felt <u>I had to take more care with it</u>. Just instinctively, and maybe was just part of it. But, just when you are handling something, especially that has little thread that you have to pull, it felt quite delicate. So, my natural reaction was to care for something delicate, just as a human. I guess that came up when I was interacting with it. It felt quite natural at the time, but it is definitely a much different experience that we are really taught to have with objects that we bring home. Especially things like furniture of interior design pieces or just even something that you bring home to put on your wall, which you take home, put on your wall and never touch it again. Just look at it, and take it down when you hate it. And, I don't think nearly as much thought goes into anything in that kind of timeline.</p> <p>P 2.6: It was <u>really beautiful to have it there</u>. It smelled really nice and because of the smell, and because of my need to participate <u>it made me think about it more than I would think about other things in the house</u>. So yes, it was just really pleasant.</p>

U 3.2 Follow-up interviews data display

Aspects investigated	Participant responses
<p>How the everyday adoption experience was perceived (i.e., what were its features)</p> <p>+</p> <p>The impact that the experience of engaging with the artefact had over the everyday domestic experience (i.e., how it changed their everyday experience, what it added to their everyday experience)</p>	<p>P 2.2. <u>'a positive experience', 'very subtle experience', 'it was very quiet in all of its characteristics, that is visually it was quiet, the act of adding a new little packet into a pocket was also a very calm, meditative experience', 'a positive small act, which you do every day over time or nearly every day, with frequency over a period of time, that makes you feel calm and engaged, and mindful about taking time', the interactions 'made you kind of slow down', artefact being used as 'a way to make people feel for a moment serene and calm, in their spaces that they call home', 'reinforced the idea of doing small acts at home as a way to make themselves feel more comfortable while home',</u></p> <p><u>'it is more about recalling how interacting with the artefact was sort of comforting, noticing how much I enjoy that and then thinking about other ways in my life that I can create those kind of comforts, which is often just doing something that helps create some sort of ambiance.'</u></p> <p><u>'I feel that I have this duty, that I was the custodian of this thing for a little while, and it was also kind of meaningful to have the responsibility, not only to take care of it but to also engage with it', 'for that period of time, it was another thing on my list that I needed to do, but I don't mean to make it sound like a burden, because it was a lovely thing to have to do.'</u></p> <p>P 2.3 <u>'very pleasant experience', 'like a ritual you do every day', 'made me feel good about my home, about living out in nature', 'offered time to stop for a second and just allow yourself some positive time', 'every day you just took a moment or two to immerse yourself in the piece'.</u></p> <p><u>'reinforces the need to take the time to relax, to calm down and have a quiet time at some point in your day', to take time to create this space that is calm and keeps you grounded', 'The importance of seeing the little things in life. Paying attention to simple things. Being more mindful. Taking care of my home, and of my environment'.</u></p> <p>P 2.4 <u>'positive experience', 'I think it can have a positive impact on people's home life and their own personal nesting habits. I think it is really interesting to think about nesting habits in general. There is something you think about with animals but we do the same things in our own homes' 'this work is very calming to look at'. I find all these colours, the purples the pinks and the linen, how its dyed is very calming to look at. So, having this in my space was very calming' 'there was no pressure to have it any certain way or have it project out to somebody else in a certain way. It was just me, the work and my own personal interaction with it. And that was it. That was really cool'.</u></p> <p><u>'I think more mindfully about my actions at home, quite a bit more. I don't write down all the actions I have with all the objects in my home, but I definitely do think about how I touch things. Those interactions we have with objects in our home are pretty significant because we spent a lot of time there and it is having the chance to really think about how I was interacting daily with this one very beautiful object.'</u></p> <p>P 2.5: <u>'different experience', 'people don't generally ask you to interact with objects in those ways', 'was very personal, much more intimate that I am used to', 'it left me with a sense of joy', 'I pay much more attention to what I bring into my home, specifically with respect to 'do I like the way it feels into my hands?', 'conscious of what I am bringing, and how it feels. Do I get pleasure from looking at it, from being around it and if not, why is it there? 'much more touch focused. Because I know I am a tactile person, but again to bring that to a conscious level and say 'do I enjoy the things I touch in my home on a daily basis, yes, or no?' And, the things that I do enjoy touching, just to touch them more. You know, hold that cup of coffee and really enjoy the way it feels. My linens are this really plain, really comfortable, boring, but I love the way they feel, cotton. Sleeping under them at night is lovely. If I was sleeping under something that was polyester, I would always have in the back of my mind that is scratchy. So, it is mostly about being conscious of what's there and why I tend to block a lot of things. If they're uncomfortable I just block them. So, just stopping that and finding ways around that instead of just blocking it all and leaving it at that. This compelled and asked maybe to engage in ways, especially with touching that I tend to find uncomfortable and find ways around that blockage, the barrier I put up.</u></p> <p><u>'I kept the colours because they are calming'</u></p>

<p>What participants enjoyed the most, what was important for them, and stayed with them.</p> <p>+</p> <p>What would make people want to have an object like this in their home.</p>	<p>P 2.6: <u>'really pleasant', 'it was nice to maintain something that gave back', 'If it would have been a bit more involved I guess I could say it would have been a bit like meditation. Something that doesn't have any factual idea that is giving back. It's not growing more leaves like a plant or giving me something to eat like cooking, but that you feel that little by little improved your life, makes your life a little better.'</u></p> <p>P 2.2: <u>'how lovely the ritual can be over time, the act of that actual engagement, which involved pulling off the thread, taking up the paper shape and putting it in the pocket, that was really nice', you delivering this box to me',</u></p> <p>P 2.3: <u>'Discovering the scent.</u> 'wonderful was the beginning because the packaging was so beautifully done. And it felt like this delicate treasure that you had entrusted to my care'.</p> <p>P 2.4: <u>'taking off the crochets and seeing what was underneath'</u></p> <p>P 2.5: <u>'these layers. I love them. The idea of holding very different materials together with a common thread, I love it. I love the way it feels, I love the way it looks, all those differences in texture and thickness and sound are fascinating.'</u></p> <p>P 2.6: <u>'I think the colours and interacting with the silky thread'.</u></p>
<p>How did the participants remembered how the artefact looked and what it did</p>	<p>P 2.2: <u>'it is made of subtle botanical images', 'it beautifies your home', 'I enjoyed the tactility of it, and its fragrance'.</u> <u>'opening this beautiful handmade paper box that you've made (I appreciate that a lot), and then unwrapping all of these little parcels of fragranced material. I don't recall what the material was but being able to unwrap them, they were soft and to place them each in their pockets'.</u></p> <p>P 2.3: <u>'it is very beautiful. The design is taken from the natural environment, so it has flowery shapes. Very organic. Floating shapes. I was reminded of jellyfish, very smooth, calming, soothing imagery.'</u> <u>it was just really fun and exciting to open it (opening these little things were wonderful moments, when you unravel it, take it out and you are wafting the beautiful scent and then attaching it to the panel and just enjoying it every day).'</u></p> <p>P 2.4: <u>'piece of linen with infused paper that was crocheted on in very beautiful shapes and colours'.</u> <u>'It was a rectangular piece of linen with infused paper that was crocheted on in very beautiful shapes and colours. I remember undoing the crochets. When the paper would fall off it would reveal new colours, and new scents. Also, the strings themselves were different colours and having them pile up was very lovely too. The thought that went into every little bit of the work was very lovely.'</u></p> <p>P 2.5: <u>'the main material was this see-through gauzy material that had a botanical print', 'on the botanical print in the spaces of flowers and leaves there were little sandwiched of materials stitched on. And there was a felt layer on the bottom, and then underneath there was a thicker paper that was saturated with the essential oil, which was either peppermint or lavender. And, on top of that I think there was another piece of paper. And, they were stitched on together with colour thread. I think there was felt on top, and it was stitched around in a running stitch, just the basic contours, and then on top of that was crocheted a net, and then you pulled the string, and the net would unravel.'</u></p> <p>P 2.6: <u>'loose drawing of plants and had scented paper attached to it. With shades of purple for the lilac and different shades of green for the mint.'</u> <u>'Mine was crocheted, so it just involved starting at the right spot and undoing itself.'</u></p>
<p>What the artefact was inspired by</p>	<p>P 2.2: <u>'A bird that did wonderful things with its nest. It was collecting certain plants as a way to make its house safer, or pleasant. I am guessing because of antibacterial properties of the plants'.</u></p> <p>P 2.3: <u>'Yes, it was about the little bird, the blue tit. It is a little bird who collects aromatic herbs from its environment to put in its nest to make it fresh and clean'.</u></p> <p>P 2.4: <u>'It was about replicating blue tit's nesting habits. The bird collects bits of lavender or different plants that are infused with different oils to steer off bacteria'.</u></p>

<p>The importance the bird story had for the participants, and the type of thoughts the connection to the bird behaviour triggered</p>	<p>P 2.5: <i>'It was <u>about the nesting behaviour</u>, and it was about <u>how overtime they would bring materials to make their nest and take it away</u>. And, kind of refurbish their little nest overtime. Also, how they would bring certain types of things to make their nest with'.</i></p> <p>P 2.6: <i>'It was to <u>imitate the bird and to bring cleansing properties to the room</u>'.</i></p> <p>P 2.2: <i>'I did not know about the bird right when I was part of the research initially. <u>It is all about the ritual to me</u>. I was keeping all of the little packets in my closet, the fragranced packets, and pulling them out and going and matching them, and also trying to decide the frequency that I was going to pop them into the pockets based on the amount of time that I had the artefact. And then of course writing about it all.'</i></p> <p>P 2.3: <i>'It made me feel more a part of nature. To mimic this tiny little being, and <u>we were both trying to keep our home nice and friendly and healthy</u>'.</i></p> <p>P 2.4: <i>'It made me think about my own home environment, but also more broadly it <u>made me think more about what we can actually learn from animals and how they live and what we can learn from that as humans</u>'.</i></p> <p>P 2.5: <i>'<u>nests are often made of botanical materials so it was a visual connection when looking at the piece</u>'. And, the fact that the piece was in my home. We describe homemaking as nesting, we use the word in popular culture, when you are making your home all cozy you are nesting, so there is a human parallel to that for sure. It brought up what do I bring into my home? And what can I do to be more conscious of each thing I bring in? It is going to benefit me? Is it not? Do I actually enjoy this thing that I am bringing into my home and if not why am I doing it? What are the reasons? And maybe if I hadn't, <u>wouldn't that be better</u>. And, also adding things. Maybe there is something that is absent that I should bring in because of the benefits involved.'</i></p> <p>P 2.6: <i>'I did not really think about replicating the bird. Because it came to me, it was given to me, I did not have to collect things.'</i></p>
<p>The memory of the interaction as a reflection of the bird behaviour</p>	<p>P 2.2: <i>'The idea of the bird has stuck in my head a little bit because I think that it is such an <u>interesting pattern</u>, that an animal would display in nature and that we also think about adorning our homes in different ways'.</i></p> <p>P 2.3: <i>'Yes. Because I started using the oils.'</i></p> <p>P 2.4: <i>'Yes.'</i></p> <p>P 2.5: <i>'I do occasionally. But I don't think that the idea of the specific bird makes it into my mind so much. It is much more abstract than that. Just again, the idea of bringing and taking away.'</i></p> <p>P 2.6: <i>'A little bit.'</i></p>

<p>The adoption experience and the type of:</p> <ul style="list-style-type: none"> - Thoughts it triggered (then and after) in relation to the health of the home environment 	<p>P 2.2: <u>'It made me think about other ways that people bring some kind of fragrance into their home. Whether that is just about making some kind of environment smell a certain way, or an intentional fragrance is brought into home, say for cleaning products, which could potentially be tied into the reason why the blue tit would be bringing different kinds of plants into its nest.'</u> <u>'What makes me think about these things the most is when I am at someone's home and there is a strong, often synthetic kind of fragrance. I consider the health benefits to that. So, I think it's made me notice more the kind of manufactured ways that we bring fragrance into homes, versus the natural. Because I think often, that the more subtle, natural ways, like this project for instance you don't notice it in the same way at all. Which could probably be a strength.'</u> <u>I do think about the artefact. If I ever do something that involves some kind of fragrance. Like if I buy a scented candle or if I walk into my house I am hit with an odour that I did not expect.</u> <u>'Being more aware of the beneficial effects that enaging in little ways (such as making a cup tea, lighting a candle) with your space can bring.'</u> <u>'But with the very small reward of the ritual of interacting with the artefact, that comfort that it would bring, can also be connected to say 'oh, I am going to wipe up the surface, because it is dusty' because there is that small amount of satisfaction that you get from doing something like that. Even though it is this kind of labour. I think it did make me see how pleasant it can be to have this responsibility, that then makes you feel a little bit good, and that can be transferred onto other tasks that you have to do in the home.'</u></p> <p>P 2.3: <u>'having this one little nest that is your home and making sure that is okay. Just try to get rid of all the clutter in your life. And that could be dirt and dust. Making sure it is always clean, and that you have a healthy environment.'</u> <u>'I think I've become more sensitive to being aware of a healthy environment. Not just in my home, but also at work.'</u> <u>'The issue of pollution in the home came up and how to purify it. How to kind of rather than getting rid of chemicals not even start having chemicals in your home. So, using more environmentally friendly products to clean. If at all, I just use baking soda.'</u> <u>'Also, I think I was very grateful, because I thought about where I live, in nature, out in the country, so I feel grateful for that, compared to let's say living in downtown New York where you are just bombarded with all the noise and traffic, pollution.'</u></p> <p>P 2.4: <u>'Thinking about my own nest', 'the role of nesting and how nesting in your own home affects your health and wellbeing.'</u> <u>'I like to keep a clean home. Tidy, most of the time. The experience of having your work in my home was positive. That whole two weeks I paid a lot of attention to everything around me. I tried to keep it very clean, so I think that definitely carried on.'</u> <u>'I pay more attention to things piling up, like dust and hair and just generally keeping the floor clean. And, having nice smelling things like natural oils. Things that aren't chemical. That are made beautiful in natural ways not through chemical cleaners, or that improve the space through chemical interaction. I try to but natural cleaners.'</u> <u>Thinking 'how my different sensory perception of things, like having natural oils around is nice. That is something that I did not think about before, but I do enjoy it.'</u> <u>'It made me think about my own space and how I interact with it (and how I interact with the objects in my home), and how I want to see my own space evolve, and my own place in it as well. Because, interacting with objects like these, makes you think about your own place in the cycle of being. My actions have consequences on the things around me and I think that is a big lesson to learn. So, I think this can be beneficial for many people, if not most or all.'</u></p> <p>P 2.5: <u>'It brought up what do I bring into my home? And what can I do to be more conscious of each thing I bring in? It is going to benefit me? Is it not? Do I actually enjoy this thing that I am bringing into my home and if not why am I doing it? What are the reasons? And maybe if I</u></p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>- Actions it triggered in relation to the health of the home environment</p>	<p>hadn't, wouldn't that be better. And, <u>also adding things. Maybe there is something that is absent that I should bring in because of the benefits involved.</u></p> <p>P 2.6: <u>'It started me thinking what other things smelled like, it made me notice things like 'the medicine cabinet smells really bad', and certain other things, like ambience smells that I wouldn't notice before, or like what the washing machine smells like. Things that are not really unpleasant but that normally I wouldn't notice.'</u></p> <p><u>'because of the smell, and because of my need to participate it made me think about it more than I would think about other things in the house'</u></p> <p><u>'I remember at one of your talks you mentioned how a lot of the allergens in our house we bring them in, with the furniture, fabrics or whatever, so I did think about it. And I did think about what do you bring in. I know plants, live plants, make oxygen and take away carbon dioxide. So, yes it did make me think about healthy things in the house.'</u></p> <p><u>'I think not so much of the bird, more of the bringing clean things into the house. Interested in Norwex products ('microfibre cloths allow you to clean without cleansers', 'laundry detergents that isn't polluting and also cleans out the inside of your washer just coincidentally', 'Swiffer like products that you don't throw away, instead you can wash out').</u></p> <p><u>'thinking about other things that I have in the closets and don't need to be washed as often because they are pleasant and are made to not be washed as often.</u></p> <p><u>'I am enjoying it, but it is changing anything in the house?'</u></p> <p>P 2.2: <u>'I started using more oils in skincare and I also use them in a difusser', 'the artefact was starting the ball rolling with more consideration, or awareness about this kind of stuff'. 'engaging with the space more by doing things that bring comfort (such as making a cup tea, lighting a candle).'</u></p> <p>P 2.3: <u>'I actually made changes in my life. I really enjoyed not only the visual but also the sensory aspect of the project, so after I gave the piece back I went and bought some lavender oil and I started out with just having a little dish with a cotton swab and I put some lavender oil on it before I went to bed and placed it on my bedside table. That was enjoyable. So, I continued with the olfactory aspect. And, just recently I went and bought a diffuser. I also bought something that is called a smoke eater spray with patchouli and lemon essential oils the patchouli has antibacterial properties.'</u></p> <p>P 2.4: <u>'I did some reading on oils and how they deter mice, and it turns out peppermint oil deters rodents, so I sprinkled that (peppermint oil) everywhere', 'I use stuff for own self-care with natural oils', 'regularly cleaning my apartment. I've always been a pretty clean person. But I guess that now I notice a lot things that fall on the ground.'</u></p> <p><u>'I engage with the space that I live in quite a bit'.</u></p> <p>P 2.5: <u>'I kept the colours in the home because they are calming.</u></p> <p><u>'I have been handling my surroundings more consciously than before for longer periods of time, than I had before. I spend more time handling my pieces even if it is just my bed as I am making it, or my tables as I am cleaning them, or curtains as I am drawing them closed. I am actually taking the time to feel a little more. Just being conscious of that nexus of touch. I have always used them (essential oils for cleaning), and I have an aromatic difusser.</u></p> <p><u>'I do think I interact with even just my furniture and my things I have in the home, like linens and everything. I think I spend a little more time handling them than I did before.'</u></p> <p>P 2.6: <u>'Bringing good things in the house and not bringing back things in the house', 'bringing less bad smelling stuff into the house', 'getting new environmental products, and eliminating some cleansers'.</u></p> <p><u>'I am less likely to buy pot flowers, because I see all that pollen coming out and my family when they are at home, they have allergies so I guess I never really thought about it. But now I am thinking like 'oh, is that stuff going to have a bad effect on someone because of the pollen?'</u></p>
<p>Awareness about air quality at home</p>	<p>P 2.2: <u>'the same way that I was before'.</u></p>

	<p>P 2.3: '<u>more</u>', 'it is kind of like getting hooked to this lavender smell. It is so soothing that you just want to be around this nice environment all the time.'</p> <p>P 2.4: '<u>more</u>', 'I try to dust my home more often, and I know I have talked about how I don't like having stuff piling up on the floor, like hair and dust, and gross stuff like that. I take notice of that a lot more now. <u>I am more mindful about dust and stuff.</u> I think about that quite a bit now. I dust quite often now.'</p> <p>P 2.5: '<u>more</u>', 'partially because I am dealing with some sensory overload right now, and I really need to watch what I expose myself to. Dust, yes. I need to dust like crazy. I have realized (maybe as a response to this, but I don't know) that my apartment is the dustiest home I've ever lived in.'</p> <p>P 2.6: '<u>To dust a little more just because I am thinking about a healthy house.</u>'</p>
<p>Additional thoughts/realizations triggered by the artefact/ interaction with the artefact</p>	<p>P 2.4: '<u>in my future home light is very important to me, I think it is good for our wellbeing</u>'. 'Before I had your work in my home I haven't really thought about <u>having artworks that I would engage with on a daily basis</u>. It made me really appreciate my space, and especially after having lived in a basement apartment for so long. It was cool, and made me appreciate my surroundings. I also think that having this work in my home I may want to pursue having in my home things that interact in my home in a similar fashion.'</p> <p>P 2.5: '<u>I remember thinking how curious it was that the substrate was so delicate. Because when we think about furniture and home things, we think about the fact that it must be strong. So, I felt that was quite a turnaround from what I was used to. And, I remember really noticing the sound, as I pulled it. The sounds as it pulled out of the paper and the vibrations that came from pulling the thread net apart.</u> 'Consciously (as this wasn't something I was conscious before) <u>the sound of materials, when they are moving. When you are touching them. And, when you are interacting with them.</u> 'There is something really, really interesting about this. It's a bit like surrender, that you are <u>using such a delicate material in such a strong position</u>. The idea of an object being vulnerable and strong at the same time, or just plain old vulnerable. And made a whole area of my home much more beautiful. Especially in North America where we are thought to throw things away all the time. I felt I had more compassion for the piece and compassion for inanimate objects in general, which maybe I wouldn't have really thought about before.' 'I would say philosophically it does. Again, I remember years ago arguing in theory class about how philosophy and ideas have layers and that you can't just put them in boxes, it's too simplistic. And, I was arguing this for years, so this kind of brought that up and it also helped me to develop that feeling a little more. I think about it more in relation to my physical experiences now' 'I think part of it had to do with the fact that the backing of it, the substrate was very delicate. <u>I felt I had to take more care with it.</u> Just instinctively, and maybe was just part of it. But, just when you are handling something, especially that has little thread that you have to pull, it felt quite delicate. So, my natural reaction was to care for something delicate.' '<u>I remember thinking about taking away versus adding things to a piece.</u>'</p> <p>P 2.6: 'was <u>nice that it wasn't just a static collectible thing</u>. I have a textile collection and I do not interact with it much. It's folded and in labeled boxes. And I could get it out and rotate it but I don't. So, it was nice having a beautiful thing that I noticed all the time.' '<u>how textiles might become, or craft objects might become, something that people would own for a variety of reasons, other than just physical use, like a bowl, or decoration, something that you just look at. It made me think what would that other dimension be, in other media.</u>' 'was <u>nice to smell and think about something in the house</u>. Because, we supposedly have all these things in our home because we love them, but I find they become part of the background and I don't really notice them anymore. Whereas with this piece, because of the multisensory thing, and because I had to do something, I always noticed it and appreciated it'.</p>

Changes to the way things happened	<p>P 2.2: <i><u>'I don't think there was anything that I would change about that experience.'</u></i></p> <p>P 2.3: <i>'I think I mentioned this in the first interview. <u>I felt the smell dissipated very quickly</u>, so it would be nice if it were stronger or if the participant could replenish the oil. So, if a little bottle with oil was put in the kit and if people wanted to, they could just add more drops.'</i></p> <p>P 2.4: <i><u>'I don't think so.'</u></i></p> <p>P 2.5: <i><u>'I might have wanted it to be a bit longer. My experience with the piece.'</u></i></p> <p>P 2.6: <i>'I think it would have been <u>nice to have a huge one</u>, because I do have room in my house. So, it would have been nice to have one floor to ceiling. A statement kind of thing. But I think most people don't have room for that. I could have lived with it longer.'</i></p>
------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

V 1 Course outline



CRFT-3160/DSGN-3161: BIO-INSPIRED ARTEFACTS
Monday/ Tuesday/ Wednesday/ Thursday 8:30 am – 12:30 pm
Instructor: Elena Brebenel
E-mail: ebrebenel@nscad.ca
Phone: 494-8173
Office: H401

Spring 2019
Room P205
3 credits

Course Description

Bio-inspiration is the study and imitation of nature. It educates and prepares students to better deal with issues of contemporary society. By learning about the theory and practice of bio-inspiration, students will gain an understanding of the critical role that bio-inspiration can play in tackling two challenges: sustainability and raising awareness. Through an interdisciplinary approach which sits at the intersection of design and biology, students will become familiarised with the method and practice of bio-inspiration. First, they will learn how to research the scientific literature for models from nature that can inform their designing and making practice. Second, by using making techniques acquired in previous courses they will generate designs that imitate the models they identified. The making process will start by generating samples, and will conclude with the creation of two portfolio artefacts that address the two challenges. Their designs will be grounded in real-world context and will be informed by readings, discussions, presentations, and reflection. The goal of the course is to help students acquire the tools and insights they need so that they can work with a bio-inspired approach.

Learning Objectives

1. To understand the role of bio-inspiration while designing for sustainability and designing for raising awareness.
2. To research scientific literature for biological models that can be used as inspiration in the design of artefacts.
3. To design and make artefacts of low technical complexity through the use of bio-inspiration.
4. To professionally present a project in visual and verbal formats.

Student Workload

Students are expected to spend 3 hours per credit **outside** class time. Therefore, for this 3-credit course, students are expected to spend 9 hours on homework.

Course Format

The course is divided in two practical projects of seven and seven classes respectively, during which students will apply the concepts learned in the class.

Each project will be introduced by the instructor through a presentation and handouts. The following three classes of each project, will be dedicated to research, answering questions and guidance for practical exercises. The remaining two classes will be for making the artefacts, while the last one will be for critique. The students will be expected to do additional research, presentation preparation and additional practical exercises as homework, and should come for questions and guidance to the class.

Course Requirements, Resources, Materials

- Requirements:
 - Personal computer
 - Supplies: sketchbook/binder (size A4), pencils, erasers, markers, USB stick.
- Resources

- Benyus, J.M. (2002) *Biomimicry: innovation inspired by nature*.
- Kapsali, V. (2016) *Biomimicry for designers*.
- McDonough, W. & Braungart, M. (2002) *Cradle to Cradle: remaking the way we make things*.
- Quinn, B. (2013) *Textile Visionaries: innovation and sustainability in textile design*.
- Quinn, B. (2011) *Design futures*.
- Quinn, B. (2010) *Textile futures: fashion, design and technology*.
- Ternaux, E. (2012) *Industry of nature: another approach to ecology*.
- Other:
 - Bioinspiration: something for everyone by Whitesides, G.M.
 - Genius of a Biome by HOK
 - Ted Talks @ www.ted.com/talks (search 'bio-inspiration' and 'biomimicry')
- Materials:
 - There is no material fee for the course. Because each project is unique and each student has the option to decide what are the materials and processes they wish to work with in order to make their artefacts you will need to supply yourself with what is needed for your projects.

Attendance

- NSCAD Attendance Policy:
Class attendance at NSCAD is expected. Absences could result in lowered or failing grades. Absences may require the student to 'make up' the content missed before being allowed entrance to future classes (e.g. safety knowledge for shop, studio). Any absences must be addressed with the course instructor who may request supporting documentation.
Please refer to 'Attendance Policy' within NSCAD Academic Calendar, Page 14 and NSCAD webpage. Instructors may adapt a more specific attendance policy that could influence the final grade for this course.
- Instructor's additional notes on Attendance:
 - Attendance is mandatory and will be taken at the beginning of every class. Because in-class instruction and activity is essential to student success, be aware that absences will significantly affect a student's development and understanding of the class materials and activities. Unexcused absence will adversely affect your final grade. **After one unexcused absence, continued unexcused absence will result in the reduction of your final grade by one-half letter grade per absence.**
 - You are expected to be on time as presentations and critiques will start promptly. Unless otherwise specified, you are expected to start working as soon as the set-up or project is established. **Three late arrivals (or leaving class early) constitute one full absence. Also, arriving +15 minutes late will count as an absence.**
 - If a student is going to miss class it is their responsibility to contact me immediately and find out what they will miss and how it may be made up. Under most circumstances, if a student is to miss a class they are still responsible for turning in the work during the next class and to review whatever materials were missed. Legitimate absence due to illness may be excused only with a note from the doctor. **Prolonged absence may make it necessary for the student to withdraw from the course.**

Health and Safety

- NSCAD Health and Safety Policy:
 - At NSCAD safety is a priority. All students are required to obtain and maintain up-to-date safety (WHMIS) certification. An online Brightspace certification process is available to all NSCAD students.
Please note that your NSCAD ID card needs an up-to-date Health and Safety (WHMIS) sticker to access shops and studios, and for Security to permit you access to the university campus after hours.
Please refer to 'WHMIS Training and Certification' within NSCAD Academic Calendar, Page 19.
 - NSCAD has a policy on Occupational Health and Safety, to which all students, staff, faculty and visitors are expected to adhere. You are advised to familiarize yourself with this policy (available

on NSCAD webpage) and with Health and Safety procedures and practices employed in the dye and print area.

- NSCAD library also has books available that detail specific safety aspects of working with art and craft materials. If you have questions about specific materials used in this course, please ask.
 - Close toe shoes must be worn in the studio at all times.
 - Smoking is not permitted anywhere in NSCAD buildings. It is also not permitted within 4 meters of exterior doorways and windows at the Fountain Campus of Academy Building. The Port Campus is located at the Halifax Seaport where there is in effect a Tobacco Free Policy. Please contact Port Security or Facilities for full details and a map for locations where smoking is permitted.
- Instructor's additional notes on Health and Safety:
 - If they have not done so already, students are required to complete the WHMIS online training between the first and the third class. The instructor will request to see documentation of WHMIS completion (sticker on the student card) during third class.

Evaluation

Course evaluation will be the sum of studio projects and assessment of participation and professionalism. Evaluation will consider research, application of bio-inspired design process, creativity, craft, presentation, and involvement [effort].

Evaluation Criteria:

Students will be evaluated with a letter grade based on 100 points. The points are assigned as follows:

- Practical projects: 90 points
 - All work is to be presented on the due dates, finished and complete. All work is to be handed to the instructor for grading at the end of the critique. Work turned in late will be recorded as such in my grade book, and will be marked down unless there are extenuating circumstances (i.e., illness with doctor's note). Each class period that work is turned in late, will lower your grade by a minus (i.e., A to A-).
 - If a project is handed in on time and demonstrates a reasonable effort, but you are unhappy with the results of your work (or your grade), you may re-do the project to raise your grade. An average grade of the two projects will be used to determine a 'new' grade. The results of the re-done project must be better than the previous results and must show substantial improvement. Simply doing a project twice will not strengthen your grade.
- Involvement, participation and professionalism: 10 points
 - Work will be critiqued in class, during and upon the completion of assignments. Critiques and class discussion animate the process. Everyone's insights are necessary and required, and it is expected that all will participate fully. Lack of participation will negatively impact your grade.
 - Show professionalism through attendance, timekeeping, preparation for class, and general studentship. Lack of professionalism throughout the semester will negatively impact your grade.

Students are expected to retain all work throughout the semester, including all work that has been submitted for evaluation. Students might need to turn in for final grading both artefacts.

Grading System:

Successful completion of this course requires that students perform to an acceptable standard in reaching the learning outcomes. This course will be graded as follows:

Letter Grade	Numeric Equivalent	Grade Point Score	Descriptive
A+	95+	4.3	excellent
A	90-94	4.0	excellent
A-	85-89	3.7	very good
B+	80-84	3.3	very good
B	73-79	3.0	good
B-	67-72	2.7	good
C+	63-66	2.3	satisfactory

C	59-62	2.0	satisfactory
C-	55-58	1.7	satisfactory
D	50-54	1.0	marginal
F (fail)	49 or below	0.0	unsatisfactory
AUD	n/a	n/a	Audit
INC	n/a	n/a	Incomplete

Brightspace

All course information (i.e., assignments, technical handouts) is found on the Brightspace page of the CRFT-3160/DSGN-3161 Bio-Inspired Artefacts course.

Academic Integrity

A climate and culture of academic integrity is an expectation of everyone. Students at NSCAD are required to comply with standard academic practices in acknowledging sources in all work presented for academic credit. Please refer to 'Academic Integrity and Plagiarism' within NSCAD Academic Calendar, Pages 24-26.

Writing Centre

The NSCAD Writing Centre in S403 offers professional tutoring for any kind of written assignment, at any level of study, at any stage of the work.

Please see the Writing Centre webpage for more information and booking online at <https://navigator.nscad.ca/wordpress/home/studentresources/the-writing-centre/>.

Accessibility Policy

Accommodations for disability-related needs can be arranged by consulting Bill Travis, Disability Resource Facilitator, in the Office of Student Experience (902-494-8313) within the first week of class.

Please refer to 'Accommodations for Students Experiencing Disabilities' within NSCAD Academic Calendar, Pages 21-23, or <https://wellness.nscad.ca>.

Instructor's Additional Notes

- On communication
 - Please check your NSCAD email regularly, as outside of class this is the primary mode of communication between you and your instructor.
 - If at any time, you are concerned about your grades, I am happy to have a meeting with you and show you my grade books. My grade book consists of a page devoted to each individual student (you filled out the grade form with your name and major on the first day of class).
 - All students should feel free to talk to their instructor at any time should they have a particular concern regarding their participation in class. As there is always work time allotted during each class period, I can usually meet some time during class. If it is not possible to meet during a class period, I can make an appointment with you during my office hours. Email or see me for an appointment. My office is in room H401 (Fountain Campus) and P225 (Port Campus). I can also be reached through email at ebrebenel@nscad.ca. Please be advised that I have 48 hours to reply to your email.
- On working in the studio
 - There are many people working in the studio, so please be as considerate as possible of your colleagues. The classroom is a professional studio and students are expected to conduct themselves in a professional manner. The proper attitude of each participant can greatly enhance the overall learning experience for everyone.
 - Because we are working in an open environment it is required that students limit their conversations to the work in progress.
- On student behaviour
 - Any behaviour that interrupts or obstructs my ability to teach and your ability to learn will not be tolerated. Some examples of disruptive behaviours are talking on the cell phones, texting, making noise, sleeping, using bad language, etc.
 - Active phones are NOT allowed in the classroom.
- On cancelling class

- If it would become necessary to cancel class due to illness or other emergency, I will contact you by email AND post a notice on the studio door. When essential, a make-up class will be scheduled.
- Other
 - Please do NOT leave unattended items such as backpacks, purses, laptops, cell phones, etc.
 - Please download the NSCAD app in order to be up-to-date with information such as snow days.

This course outline contains a lot of essential information about the course so please make sure to read it carefully and revisit it regularly during the semester.

TENTATIVE CLASS CALENDAR

This class calendar is tentative and can be changed as needed by the instructor.
The start date is May 6, 2019 and the end date is May 29, 2019.

PROJECT 1: BIO-INSPIRATION + SUSTAINABILITY

Class 1 (Monday, May 6): Introduction to bio-inspiration and sustainability

Class 2 (Tuesday, May 7): The bio-inspired process

Class 3 (Wednesday, May 8): Practical exercises (concept drawings)

Class 4 (Thursday, May 9): Presentation of concept + Making the 1st artefact

Class 5 (Monday, May 13): Making the 1st artefact

Class 6 (Tuesday, May 14): Making the 1st artefact

Class 7 (Wednesday, May 15): Critique of Project 1

PROJECT 2: BIO-INSPIRATION + RAISING AWARENESS

Class 8 (Thursday, May 16): Introduction to bio-inspiration and raising awareness

Class 9 (Tuesday, May 21): Practical exercises (concept drawings)

Class 10 (Wednesday, May 22): Presentation of concept + Making the 2nd artefact

Class 11 (Thursday, May 23): Making the 2nd artefact

Class 12 (Monday, May 27): Making the 2nd artefact

Class 13 (Tuesday, May 28): Making the 2nd artefact

Class 14 (Wednesday, May 29): Critique of Project 2

PROJECT 2: BIO-INSPIRATION AND RAISING AWARENESS**Project Brief****Theme**

The project is defined by the human problem of **'air pollution in the home environment'**.

The challenge is to design an artefact that raises awareness (RA) about air pollution in the home environment. RA often takes the form of a group of people attempting to focus the attention of another group of people on some cause or condition. Here, RA takes the form of an individual interactive experience that is aimed at focusing attention on the health of the home environment, with a focus on the health of its air.

Requirements

- The artefact should follow the bio-inspired process and the guidelines below:
 - Step 1:** Identify and analyse the human problem, and establish the context for the problem.
 - Step 2:** Biologise the design challenge and identify 3 models from nature that can be used as inspiration. Recommended but not required: consult with biologists and ecologists in order to gather further insight into the way nature deals with the design challenge.
 - Step 3:** Observe and analyse 1 model from nature.
 - Step 4: Abstract the model from nature, and formulate the design principle.
 - Step 5:** Imitate the model from nature by applying the design principle into the design of an artefact through a) concept drawings, b) physical samples, and c) artefact.
- During step 5 please use the design guidelines below:
 - (1) Make the work interactive (by having it to require physical interaction in order to function).**
 - (2) Include the story of the model (how the model achieves a healthy environment) with the artefact.**
 - (3) Use colours and shapes inspired by the aesthetics of the natural world (and/or the model).**
- The artefact should be small-scale (50 x 50 x 50 cm maximum), low-complexity and operated by hand.
- The design proposal should be limited to artefacts produced by manual methods and with simple mechanical features.
- The artefact should be real-size.

Please keep a process book in the form of a sketchbook/binder size A4. This should include any information regarding your process, such as, but not limited to, the analysis of the model, sketches, photographs of the making process, etc.

Evaluation Criteria

The 45 points for this project are assigned as follows:

- Depth of Research (10)
- Ability to synthesize and apply information to one's project (5)
- Accurate application of the bio-inspired process and creative interpretation of the biological model (10)
- Craft (10)
- Quality and clarity of ideas in visual and verbal format (10)

Important Dates

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
6	7	8	9	10	11	12
13	14	15	16 START: Project 2	17	18	19
20 NO CLASS	21	22 DUE: Research and concept drawings	23	24	25	26
27	28	29 DUE: Artefact				

<p>Class 8 / May 16 THURSDAY: Introduction to the raising awareness challenge</p> <p>Research</p>	<p>Step 1: Identify and analyse the human problem</p> <hr/> <p>Step 2: Biologise the design challenge and identify 2 models from nature</p> <hr/> <p>Student classwork:</p> <ul style="list-style-type: none"> - Identify 2 models reflecting ways in which nature creates/ maintains a home environment with healthy air. Use Ask Nature to investigate these. Example of questions you might ask are: <ul style="list-style-type: none"> ➤ How does nature ventilate? ➤ How does nature stay dry? ➤ How does nature stay clean? ➤ How does nature maintain a healthy environment? ➤ How does nature create a healthy environment? <p>Note: you are also welcome to consult with biologists and ecologists on your own, in order to gather further insight into the way nature deals with this problem.</p> <ul style="list-style-type: none"> - Present your 2 models and decide on one model that you would like to use as inspiration in your design. <p>HOMEWORK:</p> <p>Step 3: Observe and analyse the one model from nature</p> <hr/> <ul style="list-style-type: none"> - Observe the model thoroughly in order to identify the biological principle that helps it achieve its function. The analysis should start with a small bibliographic review of the characteristics of the model and continue with describing the relationship of the model with its context (or ecosystem). Research should include at least 2 scientific articles about the model. - Create 1 poster size 11"x17" that summarizes your research: <ul style="list-style-type: none"> ○ The top part of the poster should have the two models you identified including: photographs and written information about the 2 models (name of each model, what is the function it achieves and how it achieves that function). ○ The bottom part of the poster should have additional visual and written information about the model you decided to take inspiration from.
<p>Class 9 / May 21 TUESDAY: Designing @ Concept drawings</p>	<p>Step 4: Abstract the model from nature to formulate the design principle</p> <hr/> <p>Student classwork:</p> <ul style="list-style-type: none"> - Abstract the biological principle into the design principle. *Please see Genius of a Biome report by HOK for additional information about how a design principle should be formulated <p>Step 5: Imitate the model from nature through a) concept drawings</p> <hr/> <p>Student classwork:</p> <ul style="list-style-type: none"> - Imitate the model from nature by translating the design principle into practical exercises (concept drawings). Come up with two design proposals in the form of concept drawings. Both proposals should integrate the design guidelines below: *Design Guideline (1) Make the work interactive (by having it to require physical interaction in order to function). > Generate ideas about possible applications of the design principle that are interactive (i.e., require engagement with someone in order to function). *Design Guideline (2): include the story of the model (how the model achieves a healthy environment) with the artefact. > Generate ways in which the story of the model can be communicated to the people interacting with the artefact. *Design Guideline (3): use colours and shapes inspired by the aesthetics of the natural world (and/or the model) > Generate nature-inspired imagery that is part of the design of the artefact.

	<p>Optional: consider the life-cycle of the artefact, by looking for the most adequate materials, manufacturing processes, and usage options that will satisfy the user's needs while causing minor negative impact on the environment. You may take inspiration from your model.</p> <p>HOMEWORK:</p> <ul style="list-style-type: none"> - Continue the work started in class by developing additional concept drawings for the two design proposals you came up with, proposals that integrate the guidelines 1, 2 and 3. - Create 1 poster size 11"x17" that illustrates your two design solutions: <ul style="list-style-type: none"> ▪ biological principle and design principle ▪ visual (sketches) and written (text) information about your proposed artefacts.
<p>Class 10 / May 22 WEDNESDAY: Presentation of design proposals</p>	<p>Present your research and design proposals</p> <hr/> <p>Student classwork:</p> <ul style="list-style-type: none"> - Present your 2 posters size 11"x 17" (one with the scientific research and another with the design solutions). - Choose one of the design proposals to develop further, upon receiving feedback from your instructor and your classmates. <p>Step 5: Imitate the model from nature through b) physical samples/ prep work towards the artefact</p> <hr/> <p>Student classwork:</p> <ul style="list-style-type: none"> - Imitate the model from nature by translating the design principle into practical work (physical samples/prep work towards the artefact). <p>Optional: consider the life-cycle of the artefact, by looking for the most adequate materials, manufacturing processes, and usage options that will satisfy the user's needs while causing minor negative impact on the environment. You may take inspiration from your model.</p> <p>HOMEWORK:</p> <ul style="list-style-type: none"> - Continue with the work started in class by developing samples/prep work towards the artefact.
<p>Class 11 / May 23 THURSDAY: Making</p>	<p>Student classwork:</p> <ul style="list-style-type: none"> - Present your in-progress work - Continue with the work started in class by working on the artefact. <p>HOMEWORK:</p> <ul style="list-style-type: none"> - Continue with the work started in class by working on the artefact.
<p>Class 12 / May 27 MONDAY: Making</p>	<p>Student classwork:</p> <ul style="list-style-type: none"> - Present your in-progress work - Continue with the work started in class by working on the artefact. <p>HOMEWORK:</p> <ul style="list-style-type: none"> - Continue with the work started in class by working on the artefact.
<p>Class 13 / May 28 TUESDAY: Making</p>	<p>Student classwork:</p> <ul style="list-style-type: none"> - Complete the making of the artefact. <p>HOMEWORK:</p> <ul style="list-style-type: none"> - Create 3 posters size 11"x17": <ul style="list-style-type: none"> ○ First poster should include information about the finished artefact, such as: <ul style="list-style-type: none"> • Written information: <ul style="list-style-type: none"> <input type="checkbox"/> Title (optional) <input type="checkbox"/> How does it raise awareness (how does it function) <input type="checkbox"/> Its size (*if it is designed as a segment of a larger piece, please list what is its size and how big would it if completed) • Visual information: <ul style="list-style-type: none"> <input type="checkbox"/> Photographs of the finished artefact:

	<ul style="list-style-type: none"> ❖ one large photograph ❖ 3-4 detail photographs (*if it is designed as a segment of a larger piece, please visualize how the large piece would look like) ○ Second poster should include information about the design guidelines, such as: <ul style="list-style-type: none"> ▪ Written information: <ul style="list-style-type: none"> <input type="checkbox"/> Photographs of the interaction with the artefact ▪ Visual information: <ul style="list-style-type: none"> <input type="checkbox"/> The story that comes with the artefact ○ Third poster should include information about its making, such as: <ul style="list-style-type: none"> ▪ Written information: <ul style="list-style-type: none"> <input type="checkbox"/> The materials and processes involved in its making and the rationale for using them. ▪ Visual information: <ul style="list-style-type: none"> <input type="checkbox"/> Photographs of the materials and making process(es), and samples
Class 14 / May 29 WEDNESDAY: Presentation of final work	<hr/> Present all your work for project 2 <hr/> Student classwork: <ul style="list-style-type: none"> - Present your work in 5 posters 11"x17" + samples + the artefact + the process book. IMPORTANT: please email the 5 posters to the instructor @ ebrebenel@nscad.ca.



RECRUITMENT EMAIL FOR PARTICIPANTS IN THE BIO-INSPIRED ARTEFACTS COURSE

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Director of Studies: Prof. Carole Collet

Research Student: Elena Brebenel

Subject line:

Feedback Form - invitation to participate in my PhD research

Message body:

Dear Participant,

I would like to invite you to take part in my PhD research carried at Central Saint Martins, University of the Arts London. The aim of this project is to identify the potential that bio-inspired artefacts have in raising awareness about elements of the home environment readily accessible to our senses. Your participation described below is very valuable and will support part of this study.

The following describes what I am asking you to do:

- Fill out a feedback form and email it back to me. It will take between 15 and 30 minutes to complete. You will be asked questions related to the bio-inspired design guidelines you learned about and that you applied in the Project2 during the Bio-inspired Artefacts course. I have attached a copy of the feedback form to this email in order for you to see the type of questions I am asking you to answer (i.e., how the guidelines were formulated and how was the process of applying them). This feedback form will become part of the data.
- OPTIONAL: email me photographs of pages in your process book from when you were working on Project2.

In addition I will like to reference in my research your 5 posters for Project2 which you submitted the last day of class and which include information about your research, designing and making process and photographs of the artefact.

Before you decide whether or not to participate, it is important that you read the *Information Sheet* attached carefully, so that you understand the purpose of this research and what will involve for you.

If you agree to take part, please sign the consent form (see *Consent Form* attached), and fill out the feedback form (see *Feedback Form* attached) and email them back to me at your earliest convenience, ideally within a week.

Thank you so much for taking the time to read this.

I look forward to hearing back from you,
Elena Brebenel

Assistant Professor in Textiles
Division of Craft
NSCAD University
5163 Duke Street
Halifax, Nova Scotia, B3J 3J6
Canada

PARTICIPANT INFORMATION SHEET FOR PARTICIPANTS IN THE BIO-INSPIRED ARTEFACTS COURSE

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Director of Studies: Prof. Carole Collet

Research Student: Elena Brebenel

I, Elena Brebenel, Assistant Professor of Textiles at NSCAD University would like to invite you to take part in my PhD research carried at Central Saint Martins, University of the Arts London. The aim of this project is to identify the potential that bio-inspired artefacts have in raising awareness about elements of the home environment readily accessible to our senses. Your participation described below will support part of this study.

Before you decide whether or not to participate, it is important that you read through this information carefully, so that you understand the purpose of this research and what will involve for you.

The following describes what I am asking you to do:

- Fill out a *feedback form* and email it back to me. It will take between 15 and 30 minutes to complete. You will be asked questions related to the bio-inspired design guidelines you learned about and that you applied in the Project 2 during the Bio-inspired Artefacts course. I have attached a copy of the feedback form to this email in order for you to see the type of questions I am asking you to answer (i.e., how the guidelines were formulated and how was the process of applying them). This feedback form will become part of the data.
- If possible email me photographs of pages in your process book from when you were working on Project 2.

The following describes other type of data that I will like to reference in my research:

- The digital portfolio for Project 2 which you submitted last day of class and which includes information about your research, designing and making process and photograph(s) of the artefact.

If you agree to take part you are asked to sign a consent form.

During this study: (1) you have the right to check the accuracy of the data and correct any errors or ask for any materials to be removed; (2) if at some point, you wish to stop participating in the study, you have the right to do so, without giving a reason and with no detriment to yourself. Also, any information you have provided will not be further considered, and will be destroyed; (3) your identity will be kept strictly confidential throughout this study. In my writing, I will be referring to you by your role (e.g., student 1), apart from specific material in relation to which you would prefer to have your name quoted. All the information in the feedback form will be attributed to you.

I do not foresee any physical risks in taking part in the study.

Any material you provide may be used in written accounts of my research. The results of this study will not be kept confidential, they will be included in my PhD thesis, thus they will be public and will be available to other researchers.

If you have any further questions about this study or completing the tasks, or if you require additional information please contact me at any time and I will get back to you as soon as possible.

If you would like a summary of the results, please let me know by providing me with your e-mail address. When the study is completed, I will send it to you. The study is expected to be completed by December 2020.

This research has been reviewed and accepted by the University of the Arts London Research Ethics Committee and Saint Mary's University Research Ethics Board. If you have any comments or concerns about ethical matters, you may contact the Chair of the Saint Mary's University Research Ethics Board at ethics@smu.ca or 902-420-5728.

Thank you for reading this information sheet. Please keep this for your records.

CONSENT FORM FOR PARTICIPANTS IN THE BIO-INSPIRED ARTEFACTS COURSE

Project Title: What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Director of Studies: Prof. Carole Collet

Research Student: Elena Brebenel

Statement of understanding

- ☐ I confirm that I have read, understood and have been given a copy of the information sheet provided for the research study.
- ☐ I confirm that I have had adequate time to think about the research study and have had the opportunity to ask questions.
- ☐ I understand that personal details will remain strictly confidential throughout this research project, apart from specific material in relation to which I would prefer to have my name quoted.

Right to withdraw

- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, as well as to deny answering at any questions, without any legal rights being affected.

Activity consent

- ☐ I agree to fill out the Feedback Form.
- ☐ I agree to send photographs of pages in my process book from when I was working on Project 2 (if possible).

Data consents

- ☐ I understand that any material given (e.g., digital portfolio) will be held, stored, used, published, presented and exhibited in the findings of this research and may be used in future research, reports, publications, presentations and exhibitions.

Name of Participant	Date	Signature
_____	_____	_____

Name of Researcher	Date	Signature
_____	_____	_____

Participant record

A duplicate copy of the signed consent form will be given to you to keep for your own records.

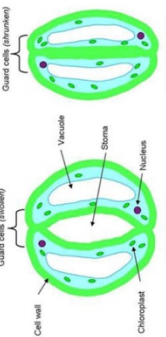
Contact for further information:

- Elena Brebenel (Research Student), NSCAD University, Division of Craft, 5163 Duke Street, Halifax NS, B3J 3J6.
E-mail: e.brebenel1@arts.ac.uk and ebrebenel@nscad.ca. Phone: 902-484-8173.
- Professor Carole Collet (Director of Studies), Central Saint Martins, University of the Arts London, Granary Building, 1 Granary Square, King's Cross, London N1C 4AA, UK.
E-mail: c.collet@csm.arts.ac.uk. Phone: 44 (0) 207-514-7140.
- Research Management and Administration, University of the Arts London, 5th floor, Granary Building, 1 Granary Square, King's Cross, London, N1C 4AA, UK.
E-mail: researchethics@arts.ac.uk. Phone: 44 (0) 207-514-2113.

Project 2: Raising Awareness Models in Nature

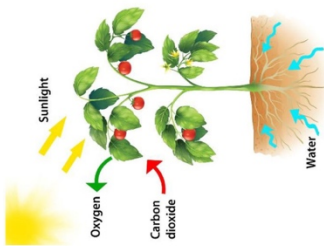
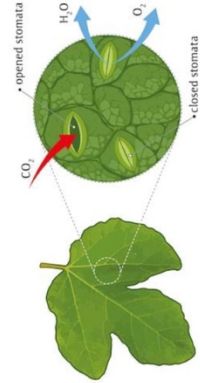
Plant Stomata

Plant Stomata are tiny openings that allow for gas exchange. They can open and close depending on environmental surroundings, therefore completely controlling how much air or water is absorbed into the plant and then back into the air. Stomata is used in photosynthesis to convert CO_2 to H_2O , but can also be used to reduce water loss by closing when conditions are hot or dry. They can open and close as a result of diffusion.



Plant Stomata – Stoma (singular)

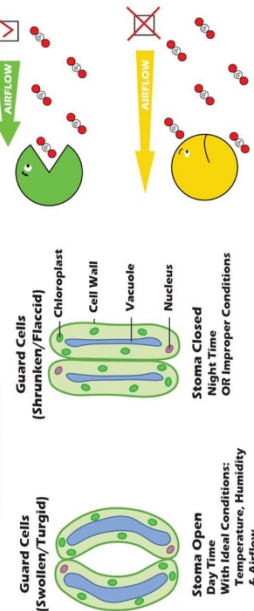
Tiny openings/pores in plant tissue that allow for gas exchange; typically found on leaves but are also on stems. They essentially look like tiny mouths which open and close as they assist in transpiration. They allow a plant to take in Carbon Dioxide, which is needed for photosynthesis, and can also reduce water loss by closing when conditions are hot or dry.



Surrounded by two types of plant cells – guard cells and subsidiary cells. Guard cells are large crescent shaped cells which surround a stoma and are connect at both ends. They enlarge and contract to open and close stomatal pores. Subsidiary Cells surround and support guard cells, acting as a buffer between them and the stomata. They can be different shapes and sizes. Stomata is open during the day because of photosynthesis, and typically closes at night to prevent water escaping through open pores. In hot/dry conditions when water loss due to evaporation is high, the stomata close to prevent dehydration.

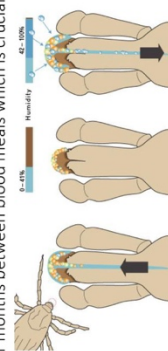
Stomata open and close as a result of diffusion: Guard cells pump potassium ions out into surrounding cells which causes water in the enlarged guard cells to move osmotically from the guard cells to the surrounding cells. The loss of water in the guard cells causes them to shrink, which closes stomatal pore. To open, potassium ions are pumped back into the guard cells from the surrounding cells. Water moves osmotically into guard cells causing them to swell and curve; this enlarging of guard cells opens the pores.

Plant Stomata



Dog Ticks

Dog ticks can absorb moisture from the air which protects them from dehydration. When humidity rises above 41%, the hydrophilic secretion absorbs the moisture and is drawn back into the tick through a 3-stage process using the salivary glands. Using its legs, it can detect microregions of high humidity. Once a water source is detected, the tick releases the secretion which becomes saturated with atmospheric water vapor. Then, the secretion is returned to the tick. This system allows for ticks to absorb water from humid air between 43% and 100% relative humidity. Ticks can stay hydrated for months between blood meals which is crucial for survival.



Project 2: Proposal

Core Biological Principles:

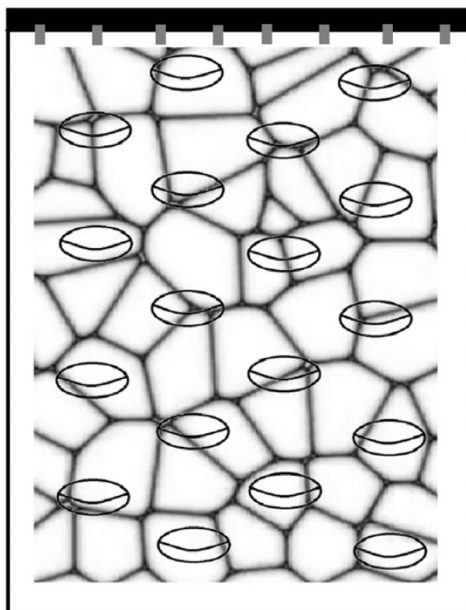
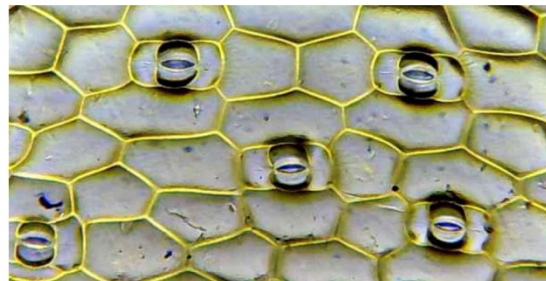
Plant Stomata, found on leaves and stems, are microscopic sized pores that allow for gas exchange. Through photosynthesis, the stomata pores take in Carbon Dioxide and converts it to Oxygen before releasing it back into the environment; creating a more purified air. The large crescent shaped cells around the stoma, called guard cells, work to enlarge and contract to open and close the pores. Stomata generally opens during the day to take in light, and closes at night to prevent water loss.

Core Design Principles:

To create a piece for a window that consists of enlarged stomata shaped openings that can be opened and closed by the viewer to mimic the action of the guard pores enlarging and contracting through the process of photosynthesis. This will not only provide a playful interaction, but will also promote awareness through visual and written materials, which will hopefully encourage the viewer to seek out air purification for the home.

Proposal #1: Shut Eye Stomata Inspired Curtain

Mimicking them being open during the day, which allows in light, and then closing them at night to protect one's privacy. Similar to the stomata which allows in light for gas exchange during the day and protects itself from water loss at night. The eye shape comes from a microscopic view of stomata on house plants. For visual interest, the fabric will be printed with repeat pattern of geometric shapes similar to a leaf's surface design under a



microscope.

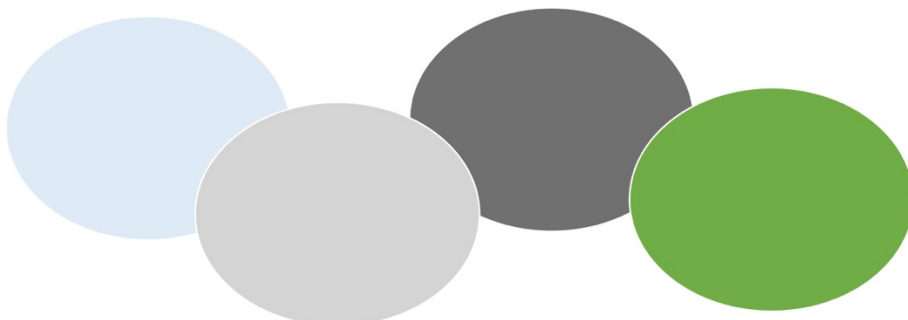
Curtain Material Choices: Cotton, linen, hemp; natural fibers that won't add pollution to the air.

Methods: Stitching, printing, and applique

Hardware: Potentially snaps, magnets, or snap purse closures

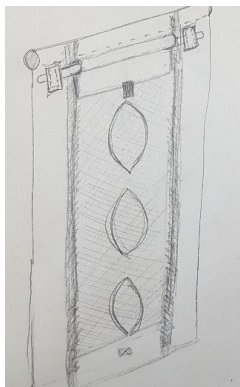
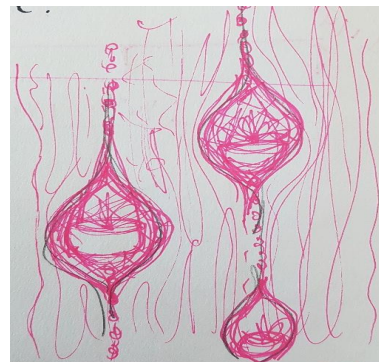
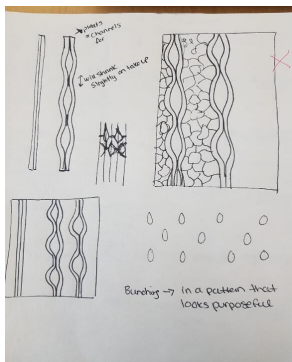
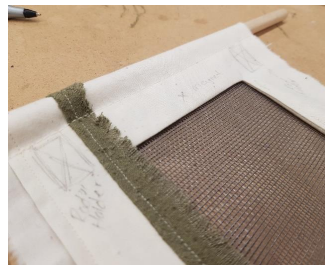
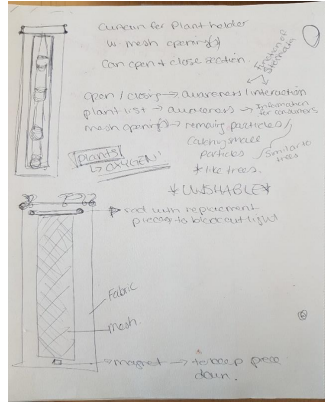
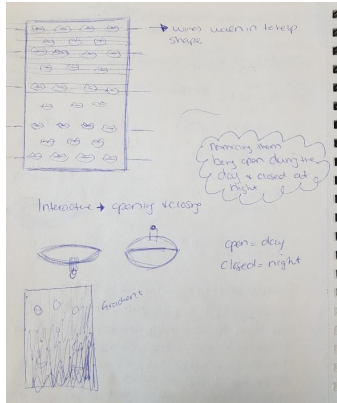
The eyes can be created one of two ways:

- 1) Using quilting/applique techniques that will allow me to insert wire, magnets, or snaps to allow for opening and closing
- 2) I can make the holes through buttonhole techniques, but then creating a separate eyelid that can be stitched on top; this can then be opened and closed by lifting up or lowering the eye lid which can be fastened on a magnet or snap.



Materials & Process

Materials: Screen-printed Cotton Muslin, Recycled Mesh, Recycled Cotton/Poly Blend, Ribbon, Wooden Dowels, Jute Rope, Cotton Rope, Plant Holder
Process(es): Sewing, Fabric Manipulation, Macramé



Almost all the materials used are either completely sustainable and biodegradable or have been recycled to give it another life. The recycled mesh is used to help collect particulate matter to prevent it from going into the air.

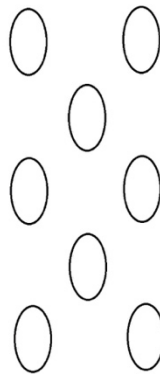
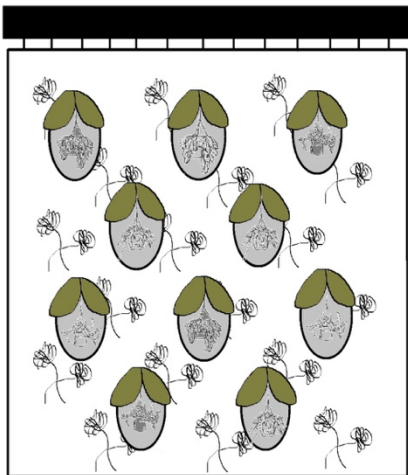
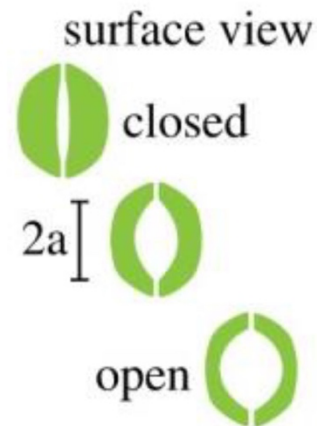


Stomata Plant Panel & Hanger

Once upon a time, there were... stomata.

Magical pores that cover the surfaces of trees and plants alike. With these tiny openings, they worked hand in hand with our dear pal photosynthesis to suck in all the CO₂ in exchange for releasing awesome oxygen. This artefact that I present to you today, is inspired by stomata, in hopes of bringing awareness to the levels of air pollution in your home. You're welcome.

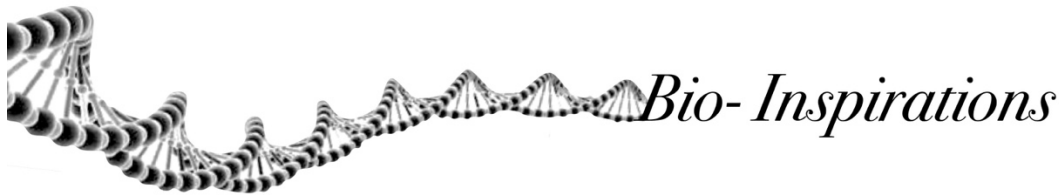
This interactive Stomata inspired plant panel brings awareness to how stomata, which are pores found on trees and plants, contribute to air purification. Through photosynthesis, Stomata take in carbon dioxide and convert it into oxygen, which is then released into our air. During the day, the stomata are opened to take in sunlight, but close at night to preserve energy. Plants are an important part of air purification in the home, especially since we inhale oxygen and exhale carbon dioxide. This panel brings awareness to the function of the stomata with its ability to open and close, just like the pores do on actual plants. When the cells are opened, we are allowing ourselves to uncover the plant which resides behind the panel; hence bringing an awareness and excitement to plants. At night, the cells are closed back up for privacy reasons; again, mimicking the closing of the stomata. By understanding how plants contribute to air purification in the home, we can move towards getting folks inspired and excited to learn more about air pollution.



This piece could ideally be a simple panel that accompanied a plant hanger, but could also be a larger curtain for a full window which would allow more sunlight and plants, which essentially provides more opportunity for the plants to exchange Carbon Dioxide into Oxygen and H₂O. This large statement piece allows opportunity for on-going conversation and interest in how the piece works in collaboration with plants.

Here are some wonderful houseplants that are appropriate for the Stomata Plant Holder which are able to thrive in direct sunlight with minimal watering.

- ❖ Spider Ivy or Spider Plant (*Chlorophytum Comosum*)
- ❖ Common Houseleek (*Sempervivum Tectorum*)
- ❖ Thread Agave (*Agave Filifera*)
- ❖ Variegated Mintleaf (*Plectranthus Madagascariensis*)
- ❖ Tropical & Succulent Plants



The Peppered Moth *Biston Betularia*

- Family – Thorns, beauties, umbers and allies (Geometridae)
- Wingspan Range – 44-56mm

The Peppered Moth *Biston Betularia* is a species of Lepidoptera found in England, Wales, Ireland, and Scotland. Before the industrial revolution they had primarily white with black speckles wings- camouflaging well with lichen covered trees. As cities and factories sprawled, their woodland habitats became blackened with soot and their primary defense mechanism became futile. By a process of natural selection and genetic mutation, their pale form (*typica*) fairly quickly became replaced by an intermediate darkened form (*insularia*) and then a black form (*carbonaria*). This process of blackening is called industrial melanism. By 1895 98% of peppered moths were black, though in 1950 Britain passed the clean air legislation addressing pollution which allowed more lichen to flourish. Today there is a diverse range of peppered moth colouring though 70% of peppered moths have returned to their *insularia* or *typica* forms. For reasons unknown the overall population has still dropped by two thirds, but it is hypothesized that this kind of rapid evolution helps animals adapt to pollution while still lessening their defense against other stressors.



A. *typical*
B. *insularia*
C. *carbonaria*

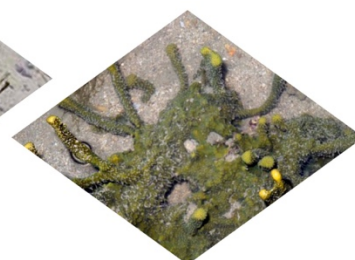
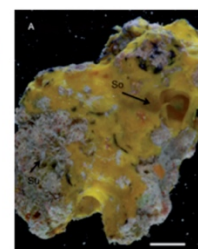
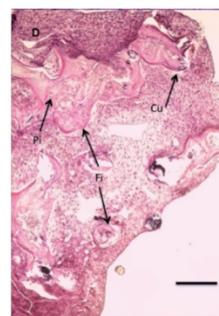


Yellow prickly branching sponge

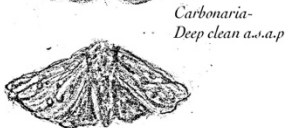
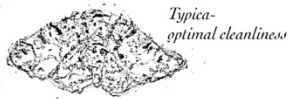
Pseudoceratina Purpurea

- Family – Pseudoceratinidae
- Variable in shape from knobs, lobes, to slim branches/stems (8-12cm) growing from an encrusting base (20-30cm)

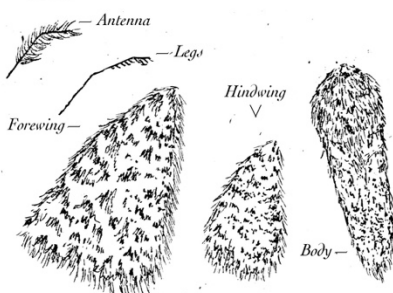
The Yellow prickly branching sponge *Pseudoceratina Purpurea* is a species of sponge found in the Indian Ocean growing on coral rubble. While alive in the water they are a bright yellow/green and covered in holes but as they oxidize and dry out on the shore they turn purple (hence *Purpurea*) and appear spikey. This sponge has been proven to combat many pathogenic bacteria and is anti carcinogenic. This is due to the fact that it contains the chemical psammaphin A amongst other healing chemicals for both themselves and humans. Its skeleton is also made of chitin (a chain of N-acetylglucosamine) which has been used in pharmacology to treat poor kidney function, high cholesterol, and inflammatory intestinal disorders. These can all be effects of pollution on the human body but these properties also protect this branching sponge from the increasingly contaminated waters of the Indian Ocean.



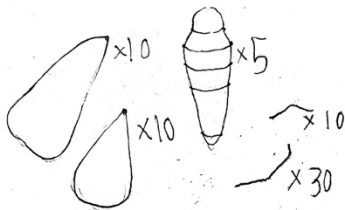
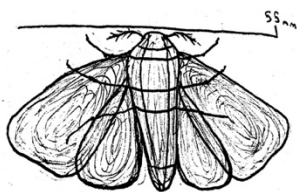
Peppered Moth Project



Parts:



Wire Structure:



Installation:



Material

- Thin jewelry wire
- White thread
- Water proof ink*
- White fabric*

*Ink Options

- Spray on black fabric dye done with stencil
- Screen printing
- Fabric pen
- Black fabric dye painted on

*Fabric options

- Organza
- Organdy
- Crushed Voile
- Wool
- Polyester blend (highest electrostatic charge but synthetic)

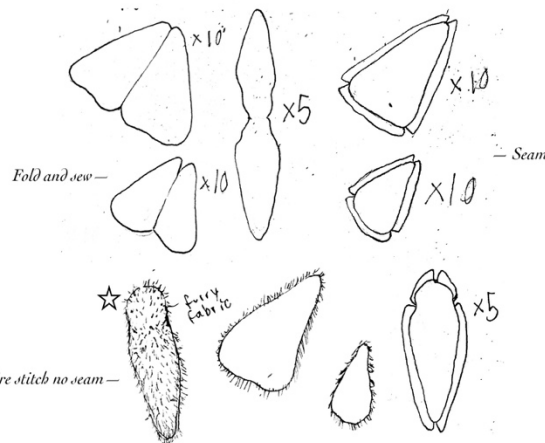
Colouring pattern-



Basic guidelines-



Possible Textile Patterns:



Biological Principle

Peppered moths evolved rapidly to camouflage themselves against trees darkened by urban pollution.

Design Principle

Air ventilation within home environments is a key element in filtering out pollutants, though their ability to trap dust which remains largely unseen due to filter designs has resulted in a lack of attentiveness to keeping them clean and functional. This leads to bacteria and particle build up that can cause a myriad of health risks for inhabitants. This product is a method of dust collection that can be attached to air vents externally in order to catch evidence of pollutants and make invisible dangers apparent to inhabitants. This would result in more a diligent cleaning routine as the dirt would be visually unavoidable. This product would be constructed to emulate Peppered Moths to scale that can be attached on home air ventilation systems. Made of a light, loose weave, translucent fabric attached to wire that can collect dust without preventing airflow. Patterned in a similar fashion to the wings of the peppered moth, the spotting would slowly become obstructed by pollutants and make be easily dusted and hand washed for reuse.

PEPPERED MOTH PARTICULAR MATTER CATCHER



Raising awareness of the impact of air pollution on the health of all living things, from insects to humans, is of utmost importance. This product focusses in on the dangers of indoor pollution caused by unmaintained build up of particle pollutants in the home. Its function is to urge users to clean their ventilation systems by making the unseen residue visible.

In addition, it addresses the issue of animal evolution around our footprint on the environment. Specifically, the peppered moth which has mutated along with its landscape in order to remain camouflaged, which has left it protected but genetically weak. This issue can be applied to all species that may or may not be adapting well to our pollution and are therefore endangered as a result, as this form of rapid evolution around human affects is dangerous and unsustainable.



The process of cleaning the filter as well as the moths would be a meditation on the nurturing of ourselves as human beings and therefore on all that coexists here with us.

Size: 9x4 cm

Multiples: 3, in commercial production would be produced with at least 5 in a package, would be created with more sustainable material and dye



Packaging



Structure/Back

Interaction

The Peppered Moth *Biston Betularia* evolved from a white with black speckle patterned species to a population of 95% stark black with the rise of the industrial era in the U.K. Air pollution killed the lichen they camouflaged with and the trees blackened with soot. Natural selection and a genetic mutation caused this industrial melanism and saved these fine flutter friends from extinction. When Britain passed the clean air legislation in 1950, the moths began returning to their original state as 70% of them remain today; though the population has dropped by two thirds. They remain a poignant example of the impact of human pollution.

The worst culprit of indoor air pollution is a poorly maintained ventilation system. Dust and particles get trapped and hidden in the grille and are often neglected. The peppered moth particular matter catcher will help make keep you attentive towards this often ignored danger. Hook the wired legs onto the vent grille and leave until you notice the wings darken and become obstructed with pollutants. When the moths look in need of a cleaning your vent should be in need as well. They can be cleaned with a small vacuum or rinsed with water.

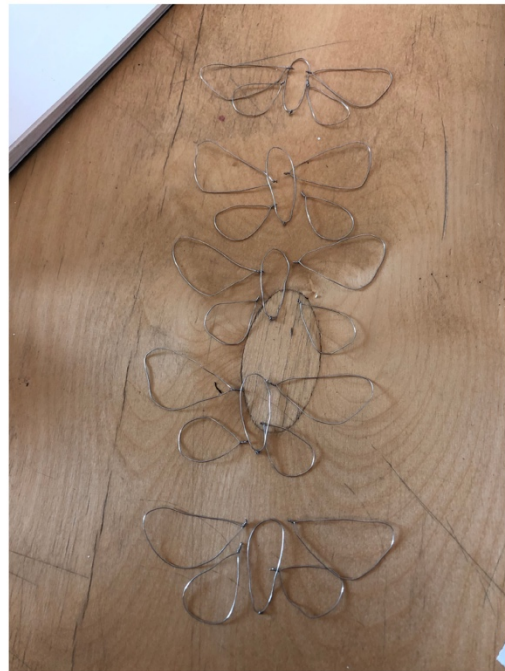


Process

Materials:

- Beading wire- thin, delicate, easily bendable
- Polyester fluffy fabric
- Polyester textured light weight
- Transperse dye- to make multiples of detailed image
- Ribbon for fraying
- Sheer woven fabric for package
- Wooden button

} transperse dye only works with polyester



Wire structures



---attempts---

Steps:

1. Make wire structure
2. Paint transperse dye
3. Iron each piece for 5 min
4. Test
5. Repaint
6. Wrap and fray antennae in ribbon
7. Sew printed fabric onto wire
8. Attach legs and antennae



Salps: More than just goo

- The marine salp has a feeding mechanism that consists of a mucus-covered net.
- The salp pulls the water around its body using its muscles, eliminating turbulence and creating a flow equal to a river on a windless day.
- Both, the mucus covering the net, and the fluid mechanical conditions inside the salp, can trap particles as small as 0.01 microns, allowing it to survive off the smallest known life-forms.

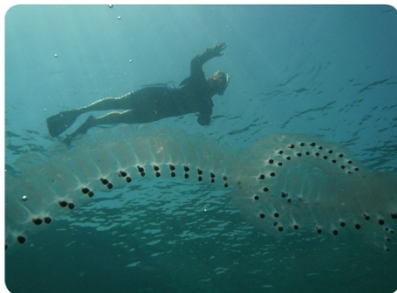


Mycorrhizae: Plants' best friends

- Certain plants are able to grow in harsh environments because of their symbiotic relationship with mycorrhizae.
- Mycorrhizae are mushrooms that grow among the roots of plants and can retain moisture, store nutrients and break down pathogens. In return they survive from the energy created by the plant.
- For example, the egyptian clover is able to survive in salty environments because mycorrhizae correct the osmotic imbalance by storing excess salt ions in vacuoles.



Filtration Mechanisms of Salps



Salps have the highest per-individual filtration rates than other zoo-plankton feeders. They pump water through one end of their body, and out of the other end using circular muscle bands, pushing them forward. Bag-like nets that occupy most of their pharyngeal chamber trap micro-algae, bacteria, and other small molecules. The filtration's success can be attributed to the following characteristics:

Mucus:

The net that covers most of the salps' inside is secreted by an organ called the endostyle. The endostyle discharges a mucus, which forms the net. This mucus allows molecules smaller than the net's density to be trapped.

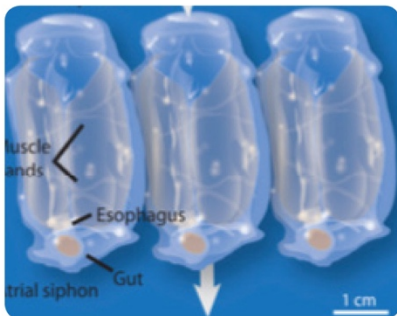
Shape of mesh:

The shape of the mesh is rectangular rather than square. This optimizes the trade-off between increasing molecule encounter and reducing the amount of material needed to form the net. The rectangular shape creates a tube longer than its' width, resulting in the ideal, internal pressure drop of the water flow.

Laminar flow:

Salps are successful filters because of the laminar flow they produce in their pharyngeal chambers. Laminar flow refers to particles in motion moving without crossing each others' path. The mean and maximum speeds at the oral siphon are lower than at the atrial siphon because the opening of the former is larger. When water enters the pharyngeal chamber, it accelerates and moves in a circular pattern. As water flows through the cavity, friction of the walls decreases the pressure and speed of the flow. This type of flow is important be-

cause it allows for direct interception: when a particle that follows a flow direction is at a distance equal or smaller to the particle's diameter from a surface, it will attach to it.



CORE BIOLOGICAL PRINCIPLE

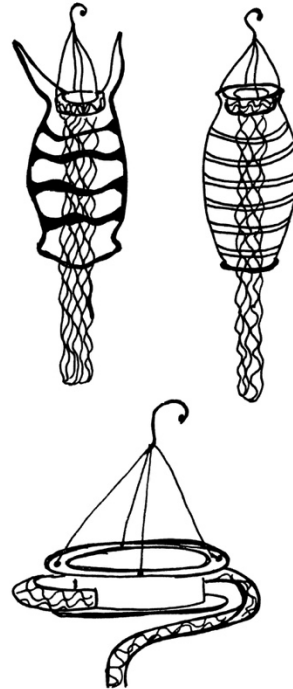
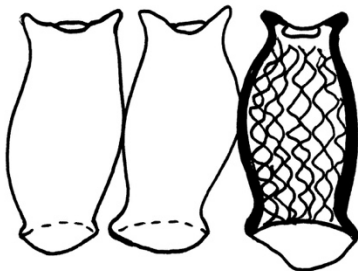
Laminar flow created by the shape of the salp's mesh and its' mucus-covered surface creates optimal filtration conditions.

CORE DESIGN PRINCIPLES

- Mucus-covered nets have a better chance in trapping molecules smaller than the net's density.
- Rectangular-shaped nets increase molecule encounter, and lowers the material needed to create the net.
- Laminar flow is not only obtained by an entrance with a large diameter and an exit with a smaller one, but also by the internal friction of the passage.
- Laminar flow optimizes direct interception.

DESIGN 1:

- Object is meant to be hung on a door handle and trap dust in a sticky net made of bioplastic.
- In order to maintain the nets' stickiness it has to be spray with water regularly.
- The regular spraying encourages examination of the net and the amount of dust that has been trapped on it.
- Large amounts of dust indicates it's time to clean up.
- After clean up, the net is cut, and a new segment is rolled out. Because it is made of bioplastic, the net can be composted.
- The top part of the salp-looking object is a roll that holds rolled-up, dry net. This roll also provides the structure needed for hanging.



DESIGN 2:

- An attachment for aprons consisting of 3 (or more) tubular structures imitating the salp's image and function.
- The shape of the tube imitates the characteristics that make salps successful filters: it's rectangular instead of square, has a bigger opening (in this case, at the bottom) than an exit, and the internal cavity is mostly occupied by a mesh.
- The outside of the salps is made of a sturdy fibre, but the inside is a mesh made of a stickier fibre, possibly silk.
- When the smoke travels up the fabric-salps during cooking, the smoke produced will get trapped in the net. The darker the net, the more aware the person is of how much smoke they are breathing.
- Encourages regular and efficient cleaning of stove and pans, reducing the amount of smoke created while cooking.

THE FILTHER FEEDER

The Filtther Feeder needs frequent care and attention to function. In return, it will create a visual representation of dust pollution at home, reminding the user the importance of periodic dusting and cleaning. The Filtther Feeder has a sticky net which collects dust particles from the air as long as it's kept moist. Continuous watering of the Filtther Feeder reveals the accumulation of dust particles, creating a visual cue for the user to dust and clean their environment. The Filtther Feeder can be reset after clean-up: the net is cut, composted, and a new net can be rolled out for further watering, observing, collecting and cleaning.



Main body: 24cm long, 19cm wide, 10cm thick.

Overall length: 60cm



Salps are ocean-dwelling, jelly-like filter feeders with high filtration rates. As water passes through their cylindrical, hollow bodies, a mucus-covered net traps organisms and even particles smaller than the net's density, such as micro-algae and plankton. The net, along with the trapped matter, is then digested all together and discharged as pellets.

The salps' mucus-covered net is the main inspiration for the Filther Feeder. Just like salps, the Filther Feeder's bioplastic net is able to passively trap dust particles when kept moist. The trapped dust will gradually make the transparent net more and more visible, indicating the need for cleaning and dusting the home. Just like in salps, the net can be reset: After dusting and sweeping, the net can be cut, and a new segment of the net pulled out from the internal chamber. As the plastic net is made out of cornstarch, it is compostable and water soluble.



INSTRUCTIONS

Step 3: Cut the protective paper close to the bottom edge of the main body or right by the exit of the internal chamber.



Step 5: ONCE the Filther Feeder's net has visibly accumulated a lot of dust, it means that it's time to dust surfaces and to sweep the floors.



Step 1: Hang The Filther Feeder from a door knob opposite the opening side.



Step 2: Pull the bioplastic until it hangs 4 to 6 inches below the lowest point of the main body.

Step 4: Using a spraying bottle, spray the uncovered net with water. Spray once and check how sticky it is, if it's still solid, spray again until it's sticky to the touch but not wet. Too much water will weaken and dissolve the bioplastic.



Step 6: Reset the Filther Feeder after taking care of your filth. Cut the dusty net using scissors and throw it in the compost. Restart a new cycle by following these steps over again.



MATERIALS AND PROCESSES

BIOPLASTIC

The Filter Feeder works because of the bioplastic net that needs to be kept moist in order to be sticky. Bioplastic is dried up glue made of natural materials, when moistened, it returns to its sticky, glue-like form. Aside from this property, bioplastic was chosen because it's compostable and creates very little waste in the process.

Bioplastics can be made of several materials. Starch was chosen because it's low environmental impact, and because it creates a transparent and flexible bioplastic, meeting aesthetic and design conditions.

Ingredients:

5g glycerine
80ml water
1.6 g starch
15 ml vinegar

Method:

Mix ingredients together in a non-reactive pot. Heat up on medium heat while stirring frequently until the mix can be easily scooped. Put the mix in a plastic bag, cut a small hole on one tip and squeeze the mix into shape.

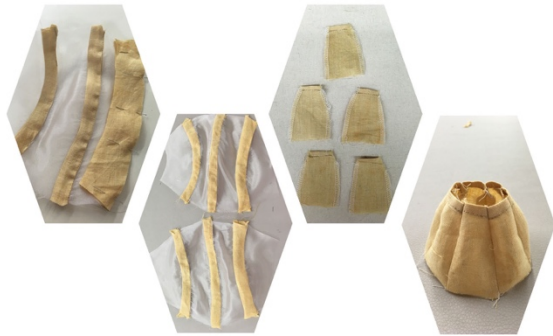
During testing, different bioplastics were made with various amounts of glycerine and starch. Glycerine helps in retaining water and making the bioplastic more flexible, while starch makes the bioplastic more sturdy.



When shaping the bioplastic net different shapes and patterns were considered keeping mostly structural stability in mind. A repeated hexagon net was the most stable option. When dried, the net is wrapped on parchment paper to avoid sticking.

FORM

The Filter Feeder's shape was inspired by the general cylindrical shape of the salp. A paper pattern of a cylinder with rounded edges was made and manipulated so that seams would run horizontally instead of vertically, referencing the muscles of the salp and giving the form support. Since salps are invertebrates, fabric was the material of choice and no solid support or boning was used.



The form was sewn alternating a shiny, polyester organza and linen. Organza best mimics the jelly-like texture of a salp and linen creates the support needed to maintain its shape. To increase this support, and create a clean, seam-free interior, the linen segments were doubled.

A 7-sided bottomless cup was then created as the interior chamber to hold the rolled-up net. Once again it was made of linen to reference the colourful nucleus of salps.

ASSEMBLY


The interior chamber is positioned inside the main body and tied together at a desirable height using linen threads. 2 linen threads are sewn on the sides of the main body, and the 4 threads are tied together to form a non-slip loop knot big enough to fit over a door's handle.

Using the buttonhole stitch, 2 holes were made on opposite sides of the interior chamber, big enough for a stick to go through. This stick is used to hold the rolled up bioplastic net and helps in rolling it out.



Salps

are ocean dwelling filter feeders with high filtration rates. As water passes through their cylindrical, hollow bodies, a mucus-covered net traps organisms and even particles smaller than the net's density, such as micro-algae and plankton. The net, along with the trapped matter, is then digested



ed all together and discharged as pellets.

The salps' mucus covered net is the main inspiration for the **Filther Feeder**. Just like salps, the **Filther Feeder's** bioplastic net is able to passively trap dust particles when kept moist. The trapped dust will gradually make the transparent net more and more visible, indicating the need for cleaning and

dusting the home. Just like in salps, the net can be reset: After dusting and sweeping, the net can be cut, and a new segment of the net pulled out from the internal chamber. As the plastic net is made out of cornstarch, it is compostable and water soluble.

INSTRUCTIONS

- Hang the Filther Feeder on a door knob, roll the bioplastic by pulling down on it, and cut the protective paper
- Spray the newly

un-covered net with water using a spray bottle. Make sure not to over-spray the net or it will dissolve. If it's sticky to the touch, it is ready to start collecting dust.

- Make sure to consis-

tently examine the level of stickiness of the net. Make sure it stays moist by spraying it with water every 2 days.

- Once the net is filthy, it is time to clean up floors and other surfaces

- Re-set the Filther Feeder by repeating step 1

2 Biological Models



Baleen whale uses fringe to filter out food

Baleen whales (blue whales, right whales, bow whales, pygmy right whales, and grey whales) feed mostly off of plankton, krill and small fish. Instead of teeth, these whales have dense colonies of bristle-like hairs lining the roof of their mouths. . When the whale consumes a mouthful of water, it partially shuts its jaw and uses its tongue to expell the water through the baleen, leaving behind the krill and fish to swallow.



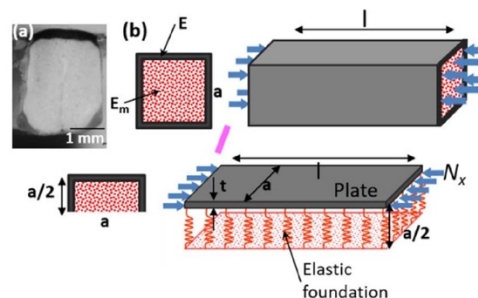
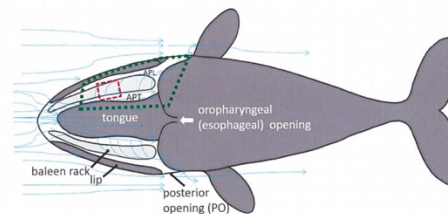
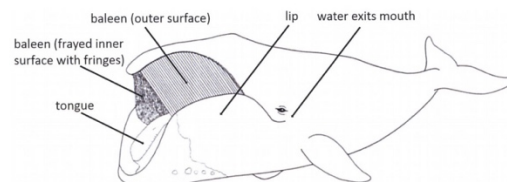
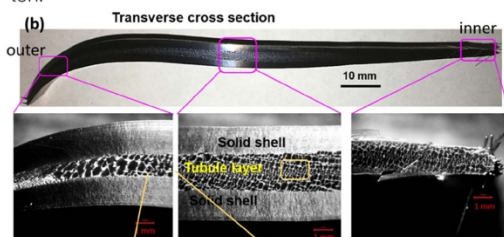
Tree leaves filter out air pollutants

Leaves are able to cleanse the air through passive absorption of pollutants and through photosynthesis, where they absorb CO₂ in the environment and convert it into oxygen. Recent research has shown that plants increase their air filtration capabilities when in the presence of oVOCs. OVOCs are a category of volatile organic compounds, the most abundant class of carbon based particles which come from burning exhaust and coal, that have bound to oxygen particles leading to increase global warming. When plants are exposed to these oVOCs, they increase their normal uptake of these compounds, absorbing 40% more than previously thought by scientists.

Additional Research

The baleen setae reside on baleen plates. The baleen plate is a fibrous composite that exhibits anisotropic properties, meaning having a physical properties that is different when measured in different directions (for example, wood being stronger along the grain than across it). The plates provide an elastic foundation, being comprised of two layers of solid shell encasing a porous layer comprised of tubules. The setae extend from these plates, made up of an abundant protein called keratin. The setae have the same anisotropic properties, allowing them to fray into hair-like structures necessary for filtering.

300 consecutive baleen plates reside between the tongue and the lips of the bow whale. The whales are able to feed themselves by remaining static and using a flow-through filtration system. This system has been compared to a sieve or venetian blinds. However, it is not only the filtration system and setae that bring in food. The tongue is also believed to play an important role in the retrieval of plankton.



Proposed Models

Core Biological Principle

The baleen whale has specialized brush-like structures in its mouth in order to effectively filter out krill and plankton. The structures, called baleen, are made mostly of keratin. When the whale consumes a mouthful of water, it partially shuts its jaw and uses its tongue to expell the water through the baleen, leaving behind the krill and fish to swallow.

Core Design Principle

Bristle-like structures can be used in areas of heavy air-flow to collect dust particles while filtering out clean air.

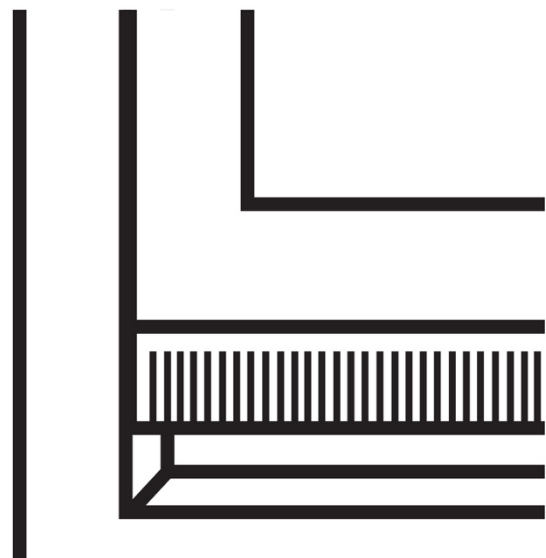
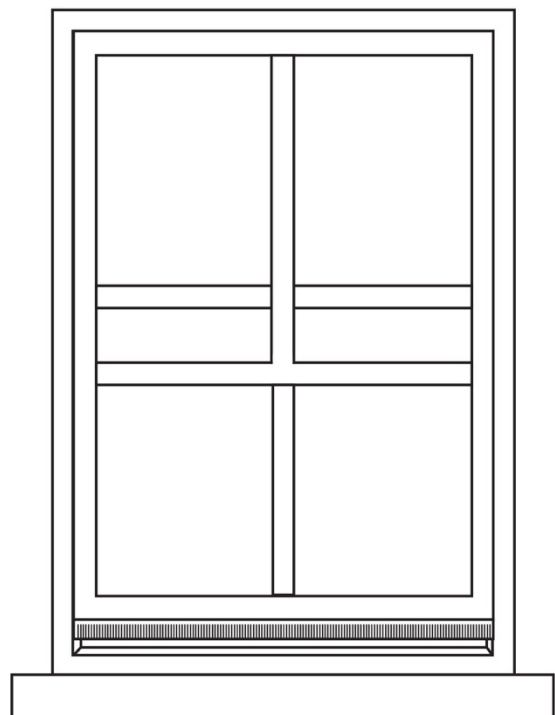
Model I: Dust Filter for Window

The first model is a dust filter for open windows. It aims to raise awareness by encouraging the user to leave their windows open to promote new air flow as many people leave their windows closed too often. With new air, there lies the potential to introduce pollutants into the home such as pollen, animal dander and dust. The filter would consist of either segments or a strip of short, firm yet flexible bristles. These segments could be attached to the bottom of the window using velcro. Velcro allows to easier removal and replacement when washing or emptying the filter.

This filter aims to raise awareness in two ways: through encouraging the user to leave their windows open more often during warmer months, and to be aware of the amount of dust potentially entering your home so you can take action to reduce it. The user interacts with the artefact by setting it up and by regular maintenance in order to prevent trapping dust from escaping.

Since it is believed that the tongue plays an important role in the retrieval of food, it would require external interaction in order to mimic the natural animal behaviour. The physical cleansing of the sections and bristles would replicate this action of the tongue.

Keratin acts similarly to chitin. It is also what forms hair and nails, along with hooves, claws, shells and horns. There are two types of keratin: alpha keratin and beta keratin, or hard and soft keratin. More recently, it has been classified into two types: epithelial and hair keratins. Some whales have more calcified baleen to increase stiffness. Currently, keratin cannot be synthesized. However, some similar naturally occuring structures are wool and feathers. Potential materials include corn husk, hair or synthetic fibres. The fibres should be stiff enough to combat potential wind or draft.



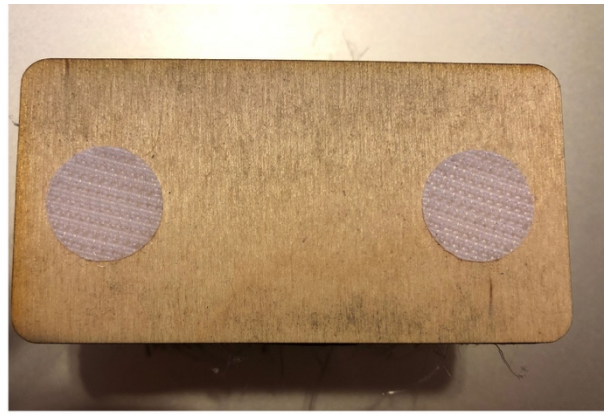
Whale-Inspired Dust Filters for Windows and Doors

This collection of bio-inspired dust filters were created to raise awareness on air pollution inside the home. These filters attach under windows in order to encourage the user to leave their windows slightly open more frequently to allow for new air circulation. These filters can also be placed under doors where there is a lot of draft. The pressure of the wind or drafts forces dust particles to become trapped between the hair-like structures, which the user must clean out regularly. This system creates awareness through two processes: the act of leaving the window open and the act of cleaning the dust from the filters.

There are three different sizes of these segments: 3x1.5 inches, 2x2 inches, and 1x2 inches. These segments would come in packages of 24 segments, with 10 3x1.5 inch pieces, 8 2x2 inch pieces, and 6 1x2 inch pieces.

Human Interaction

These dust filtering tiles require regular maintenance for optimal performance. The first interaction is the initial act of placing the tiles around your home and assessing which areas are more prone to high amounts of dust. The main interaction that raises awareness is the act of cleaning the filters. In baleen whales, the tongue plays an important role. While the baleen keep the food sources on the inside of the mouth, a large portion become trapped in the dense net of fibres. The tongue is then used to retrieve the leftover plankton from the baleen. This action is replicated by the user using their hand in place of the tongue to retrieve the dust particles from the filters. This action also promotes to user to consider what type of dust is being trapped and what actions they can take to reduce the amount found within the house.



Materials and Process

Plywood: Used for its thinness, which allows it to be easily cut with a laser cutter. The dense structure of the wood replicates the two outer layers of the baleen plates, which protect the porous inside from becoming crushed or damaged.

Cardboard: Used between the outer casing of plywood to add structure to the main plate. Meant to imitate the fibrous tubes that run longitudinally across the inner layer of the plates.

Broom Bristles: Upon the original conception of the idea, corn husk was going to be used to replicate the baleen bristles of the whale. However, further investigation and planning led to the conclusion that a material that would not biodegrade as quickly would be better for the optimal lifespan of this project. Broom bristles exhibit the anisotropic values that actual baleen plates rely on to trap food, as the ends fray easily into hair-like structures.

Velcro: Velcro is used to attach the segments along the bottom of the window frame to allow for easier removal when it comes time for cleaning.

Hot Glue: Hot glue was used as the adhesive of choice as it is not water soluble and does not emit VOCs into the environment.



V 7 Scans of the feedback forms

V 7.1 Feedback form of student no.1

FEEDBACK FORM

Project Title: *What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?*

Supervisory team: Prof. Carole Collet and Prof Janet McDonnell

Research Student: Elena Brebenel

The only purpose of this form is to identify the way you understood and applied the guidelines for bio-inspired design that raises awareness about air quality.

Please read the comments/ questions carefully and answer as thoughtfully as possible.

PART I: write a number from 1 to 5 after each comment.

[1= strongly disagree; 2= disagree; 3= neither agree nor disagree; 4= agree; 5= strongly agree]

1	The guidelines were clearly formulated	5
2	The guidelines were easy to apply	4
3	At the end of the project there was a clear understanding of the guidelines	5
4	The project required good knowledge and familiarity with the bio-inspired design process	5
5	The project made you consider a way of dealing with challenges that is solution and prevention-based	5
6	You have a clear understanding about the role that bio-inspiration can play in raising awareness	4

PART II: answer to the questions below.

1. If you were to explain the design guidelines, how would you explain them?

To start, identify a problem that exists, then look to nature to see how nature adapts to similar or relevant problems. By looking at how nature resolves its problems or even adapts to changes, we can learn immensely. Once a particular model is found, it is important to observe and analyze. Pay attention to how it works, the engineering and mechanics. Then, take this model and break it down into an abstract form that is simplified enough, which can be used as a potential solution to the problem at task. It's a way of looking to nature to not only be inspired, but to also learn from it. This design guideline has proven to be effective in this class that I have taken.

2. What aspect of the instructor's teaching helped you understand and apply the design guidelines?

By showing examples of bio-inspired artworks, projects, and establishments that incorporate these guidelines. And by having open discussions of what bio-mimicry & bio-inspiration can ultimately mean. Also, by breaking down the guidelines into steps, it really helped us execute each step of the design process as we were learning to think outside of our normal comfort zone.

3. If any, what challenges did you encounter in applying the design guidelines?

The struggle I had was, how I can effectively take from nature and apply to every day life, which will help to tackle air pollution in the home. It can sometimes feel like a daunting task; but it is very important that we start to implement these steps of the guidelines into everyday practice in order to be more aware of the pollutants surrounding us.

4. Do you think there is any additional information that you should be provided with or any support that you should have been provided with, that could assist you in the application of the design guidelines?

If so, what kind of information/support?

I don't think so. I think this is a very different way of thinking for myself, so I am excited to learn more from this topic and apply it to my every day life. I am sure that there will be much more to learn as I do more exploring.

5. Could you please comment of the amount of information about bio-inspiration and the bio-inspired processes that is necessary in order to apply the design guidelines?

I think a basic understanding of what bio-inspiration is, is extremely important. To understand the difference is important work from them. I think the design guidelines are clear enough for anyone looking to create bio-inspired work. Its just the amount of research and time that they put into their own projects which requires more information.

6. What was the most important thing you learned while working on this project?

That's a hard one, because I learnt oh so much. I learned a lot of about how to look at nature, how to extract the important elements from it, and how to apply it in a way that can spark a conversation about air pollution in the home. By creating something that I consider a statement piece, it invites curiosities, which in turn provides a person opportunity to educate and make aware the current health issues that exist in the home; by addressing important issues through nature.

FEEDBACK FORM

Project Title: *What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?*

Supervisory team: Prof. Carole Collet and Prof. Janet McDonnell

Research Student: Elena Brebenel

The only purpose of this form is to identify the way you understood and applied the guidelines for bio-inspired design that raises awareness about air quality.

Please read the comments/ questions carefully and answer as thoughtfully as possible.

PART I: write a number from 1 to 5 after each comment.

[1= strongly disagree; 2= disagree; 3= neither agree nor disagree; 4= agree; 5= strongly agree]

1	The guidelines were clearly formulated	4
2	The guidelines were easy to apply	4
3	At the end of the project there was a clear understanding of the guidelines	4
4	The project required good knowledge and familiarity with the bio-inspired design process	5
5	The project made you consider a way of dealing with challenges that is solution and prevention-based	5
6	You have a clear understanding about the role that bio-inspiration can play in raising awareness	5

PART II: answer to the questions below.

- If you were to explain the design guidelines, how would you explain them?
 - First to look into methods/solutions nature uses to deal with certain problems. Pick a process to research and then simplify the findings into principles that can be used as design guidelines. Making sure that the story of the object, how it was inspired, etc, is included and reflected when used.
- What aspect of the instructor's teaching helped you understand and apply the design guidelines?
 - The examples really helped. Also breaking down the guidelines as steps and having a talk after each one was completed was really helpful.
- If any, what challenges did you encounter in applying the design guidelines?
 - Finding a suitable process was the first challenge since sometimes it wasn't clear how the research would apply to making a useful object. Simplifying the guidelines was hard too because through the research you get to learn about the complexity of processes and how they are able to work because everything is in sync.
- Do you think there is any additional information that you should be provided with or any support that you should have been provided with, that could assist you in the application of the design guidelines? If so, what kind of information/support?
 - I think there wasn't enough discussion of what creating something "useful" could mean. Because there is a recent culture of being "innovative" and creating new technologies, etc, it's really hard to get out of the idea that useful means that it actively does something to solve a problem. I think the awareness these objects bring is through their own presence in the home and not really because of how useful they were at a certain task, and it was not until I figured that out that I was able to carry out the projects and apply the design guidelines.

5. Could you please comment of the amount of information about bio-inspiration and the bio-inspired processes that is necessary in order to apply the design guidelines?
 - I think some information about the bio-inspired processes is necessary to apply the guidelines, otherwise they wouldn't make a lot of sense. I feel like a lot of bio-inspiration examples (i.e the moving textiles, the shark skin, etc) are not as necessary as the ones that create awareness through interaction (the rain/dye clothes, the wallpaper, etc). But then again, they really helped distinguishing and narrowing down what bio-inspired artefacts actually are.
6. What was the most important thing you learned while working on this project?
 - a. I think when people think about progress and environmental awareness, they think of technology and ways we can combat the source of problems. There's something really refreshing in learning that this can be done at a different, more personal level with bio-inspired artefacts that do not require many resources to make. And obviously just figuring out a process in how to apply science knowledge (that I already have) in art in a productive way instead of just using it for looks.

V 7.3 Feedback form of student no.4

FEEDBACK FORM

Project Title: *What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?*

Supervisory team: Prof. Carole Collet and Prof Janet McDonnell

Research Student: Elena Brebenel

The only purpose of this form is to identify the way you understood and applied the guidelines for bio-inspired design that raises awareness about air quality.

Please read the comments/ questions carefully and answer as thoughtfully as possible.

PART I: write a number from 1 to 5 after each comment.

[1= strongly disagree; 2= disagree; 3= neither agree nor disagree; 4= agree; 5= strongly agree]

- 1 The guidelines were clearly formulated **5**
- 2 The guidelines were easy to apply **4**
- 3 At the end of the project there was a clear understanding of the guidelines **5**
- 4 The project required good knowledge and familiarity with the bio-inspired design process **5**
- 5 The project made you consider a way of dealing with challenges that is solution and prevention-based **5**
- 6 You have a clear understanding about the role that bio-inspiration can play in raising awareness **5**

PART II: answer to the questions below.

1. If you were to explain the design guidelines, how would you explain them?
Very thorough, clear guidelines explaining each element of the process.
2. What aspect of the instructor's teaching helped you understand and apply the design guidelines?
Presentations before beginning projects, clear guidelines, willingness to discuss.
3. If any, what challenges did you encounter in applying the design guidelines?
In the time given due to the length of the semester, it was difficult to generate new ideas.
4. Do you think there is any additional information that you should be provided with or any support that you should have been provided with, that could assist you in the application of the design guidelines? If so, what kind of information/support?
N/A
5. Could you please comment on the amount of information about bio-inspiration and the bio-inspired processes that is necessary in order to apply the design guidelines?
I had a previous lecture, but it was on bio-design. but we were given a presentation and readings on bio-inspiration. I felt this was enough to start working with bio-inspiration.
6. What was the most important thing you learned while working on this project?
Bio-Inspired design requires more research than most would anticipate, and nature has a solution for almost everything but it is up to designers to identify that solution.

ual:

Elena Brebenel
Central Saint Martins

Date: 31st July 2017

— Dear Elena

What is the potential that bio-inspired artefacts have towards achieving a better (healthier) home environment?

Approval following Chair's action

I am writing to you as Secretary of the Research Ethics Sub-Committee (RESC).

Your application for research ethics approval has been reviewed by Professor Malcolm Quinn (RESC Chair) and I can confirm that that your project is approved by Chair's action.

Please note that this approval is based on the information provided in your application. Research projects may be monitored and called in for review at any time by RESC. Any substantial changes proposed to or deviations from the original application should be reported to RESC for consideration.

Yours sincerely



Clare Shelton
Secretary, Research Ethics Sub-Committee

University of the Arts London
Granary Building
1 Granary Square
London N1C 4AA
United Kingdom

+44 (0)20 7514 2113
researchethics@arts.ac.uk
www.arts.ac.uk

Camberwell College of Arts
Central Saint Martins
Chelsea College of Arts
London College of Fashion
London College of Communication
Wimbledon College of Arts



RESEARCH
ETHICS BOARD

T 902.420.5728
F 902.496.8772
ethics@smu.ca

CERTIFICATE OF RESEARCH ETHICS CLEARANCE

This is to certify that the Research Ethics Board has examined the research proposal:

SMU REB Registration Number:	18-137
Title of Research Project:	What is the Potential that Bio-inspired Artifacts Have Towards Achieving a Better (Healthier) Home Environment.
Faculty, Department:	NSCAD, Craft
Principal Investigator:	Elena Brebenel
Co-Investigator:	n/a

and concludes that in all respects the proposed project meets appropriate standards of ethical clearance and is in accordance with the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans (TCPS 2) and Saint Mary's University relevant policies.

Clearance Period: December 14, 2017 – December 14, 2018*

CONTINUING REVIEW REPORTING REQUIREMENTS

ADVERSE EVENT

Adverse Event Report: <http://www.smu.ca/academic/reb/forms.html>

Adverse events must be immediately reported (no later than 1 business day).

SMU REB Adverse Event Policy: <http://www.smu.ca/academic/reb/policies.html>

MODIFICATION

FORM 2: <http://www.smu.ca/academic/reb/forms.html>

Research ethics approval must be requested and obtained prior to implementing any changes or additions to the initial submission, consent form/script or supporting documents.

YEARLY RENEWAL*

FORM 3: <http://www.smu.ca/academic/reb/forms.html>

Research ethics approval is granted for **one year only**. If the research continues, researchers can request an extension one month before ethics approval expires.

CLOSURE

FORM 5: <http://www.smu.ca/academic/reb/forms.html>

The completion of the research must be reported.

*Please note that if your research approval expires, no activity on the project is permitted until the research ethics clearance is renewed. Failure to hold a valid SMU REB Certificate of Research Ethics Clearance or Continuation may result in the delay, suspension or loss of funding as required by the federal granting Councils.

On behalf of the Saint Mary's University Research Ethics Board, I wish you success in your research.

Dr. Veronica Stinson
Chair, Research Ethics Board, Saint Mary's University

Bioinspired textiles that raise awareness about domestic air quality

ABSTRACT: This paper presents the design and evaluation of interactive textile artefacts that raise awareness about domestic air quality (DAP). It aims to establish an approach to raising awareness that inspire people to improve their homes, without making them anxious about the problem and its effects on their health, therefore contributing to participants' well-being. The research draws inspiration from scientific literature, with a focus on the ritualistic nest behaviour of blue tit (*Cyanistes Caeruleus*) female bird (NBBTFB). It utilizes bioinspiration as a way to abstract design principles from biological models and apply them to the design of artefacts; and the design of rituals, as this allows to create experiences that consist of repetitive actions that have meaning which can stimulate awareness. The research stages include: developing the design brief, generating textile samples and artefacts, and testing by undertaking two adoption experiments, and using qualitative methods of data collection and analysis.

1 INTRODUCTION

This research is situated at the intersection of textile design and bioinspiration (Whitesides 2015). The work is applied to DAP. In the home environment, we are constantly exposed to the hidden effects of microbial and chemical factors that affect the air quality and have a negative impact on our health (World Health Organisation [WHO] 2009, 2010). In this context, the research addresses the following question: How can bioinspired textile artefacts raise awareness about the health of the home environment with a focus on air quality?

The outcome of this research is eight interactive textile artefacts (Fig.1) that raise awareness about the health of the home environment while contributing to participant's well-being.



Figure 1. Interactive textile artefacts (various scales). Photographs by the author.

2 CONTEXTUAL REVIEW

2.1 Air quality at home

In general terms, the concept of DAP refers to the contamination of air in the home environment by multiple factors (i.e., biological and chemical) leading to health complications such as asthma (WHO 2009), liver and central nervous system damage (United States Environmental Protection Agency [US EPA] 2018), and even cancer (European Commission Scientific Committee on Health and Environmental Risks [EC SCHER] 2007). The main biological factors (i.e., filamentous fungi) are to be found in dust, while main sources of chemical pollution (i.e., volatile organic compounds) are household products (e.g. air fresheners, cleaning products), furnishings, building materials and construction practices. In addition, occupant behaviour, poor ventilation, and humidity also contribute to DAP.

The main challenge when dealing with this issue is the combined exposure since there is no solid research on the interaction of biological and chemical elements at home and the combined effects of indoor air pollutants on human health (EC SCHER 2007). As a result, there is no feasible way of targeting the effect of these mixtures of pollutants, because even if we are to design products that target biological and chemical factors, or a combination of these factors, it would be impossible to target the myriad of combinations existent in the

home. Therefore, the main recommendation official sources make is to reduce exposure.

In this research, raising awareness about DAP is seen as a pragmatic way that can work effectively in preventing the generation of DAP.

2.2 Bioinspiration

Whitesides (2015) defines bioinspiration as a process through which one can use and apply information from nature, a process that is based on: observation of living organisms' functions (i.e., behaviours), abstractions of those functions, and imitation of those functions.

The bioinspired design process started with a review of scientific literature on biological models. This review was guided by questions, such as: how does nature keep environments free from biological/chemical factors? how does nature protect itself from biological/chemical factors? how does nature maintain a healthy environment?

The NBBTFB was identified as an appropriate biological model because it involves placing aromatic plants with antimicrobial characteristics (lavender [*Lavandula Stoechas*], apple mint [*Mentha Suaveolens*], daisy [*Helichrysum Italicum*] and yarrow [*Achillea Ligustica*]) in its nest in order to protect its chicks against pathogenic bacteria and parasites (Mennerat et al. 2009).

2.3 Ritual

Many definitions of rituals exist but here ritual is understood as a *repetitive* type of *action* (during which ritual participants do something to something or someone) that has *meaning* (Sorensen 2005). According to the literature, rituals engage people in activities that stimulate reflection and awareness (Moore & Myerhoff 1977), which allow people to establish a new behaviour by transitioning smoothly into it (Ozenc 2014).

Ritualization is the process of turning an activity into a ritual. According to Stephenson (2015), the ritualization of an action is accomplished through a variety of means, such as, but not limited to: repeating the action, prescribing the steps, framing the action temporarily, and/or performing the action.

Ritual is an experience, thus in designing a ritual the research makes use of experience design principles (Shedroff 2001) such as: experiences organized around the telling of stories can be some of the most compelling and involving, experience design involves interaction design, which focuses on designing the interactivity between a product and its participants, experience design involves sensorial design, that is design that engages with our senses,

and engagement seen as active participation is key to successful experiences.

3 DESIGNING AND MAKING

A design brief provided the framework for the practice. The brief was to generate ways to raise awareness about air quality at home following a bioinspired design approach, through the designing and making of textile samples and artefacts. As a result, I developed three sets of small-scale samples, six medium-scale samples, and eight large-scale artefacts. Their making drew upon my detailed knowledge of textile design with a particular emphasis on surface design, and a focus on printing, embroidery, and crochet.

3.1 The bioinspired textile design process

Upon identifying the biological model, I applied Whitesides's (2015) bioinspired approach that involves: observing the NBBTFB and formulating the biological principle (which describes how NBBTFB functions); abstracting the NBBTFB and turning the biological principle into the design principle (which describes the biological principle without using biological terms); and imitating the NBBTFB by identifying ways in which the design principle can be translated in the design of textiles.

Here, the design principle is repeatedly placing external elements into the home that are maintaining its health. In identifying ways in which the action of the bird placing plant fragments in the nest could be translated into actions that could be replicated by the participants, I generated a list of verbs that would represent how loose fragments could be added to the background panel, such as *to place*, *to attach*, *to connect*, *to attract*. Because I made this an exploratory exercise I went beyond what the bird is performing (i.e., adding plant fragments) and generated a list of antonym verbs to the one I previously created, therefore imagining ways in which loose fragments could be removed from the background panel. This includes verbs such as *to take*, *to detach*, *to disconnect*, *to repel*. I continued with examining 'how can these actions be translated into textile artefacts?' As a result, a series of strategies for achieving these actions were identified, strategies informed by textile craft techniques (i.e., *weaving*, *folding*, *stitching*, *tying* or *crocheting*). The translation of actions into craft techniques mirrored the previous process about generating the list of verbs. The resulting pairs were: weave/unravel weave, fold/unfold, stitch/unstitch, tie/untie, crochet/unravel crochet (Fig. 2).



Figure 2. Translation of the design principle into the design of textiles.

Examples of how the design principle was translated include: the creation of pockets in which the fragments could be placed, the cutting of slits into the background where fragments could be inserted, and making the end thread of a crochet visible so that it can be pulled and unravelled (Fig. 3).

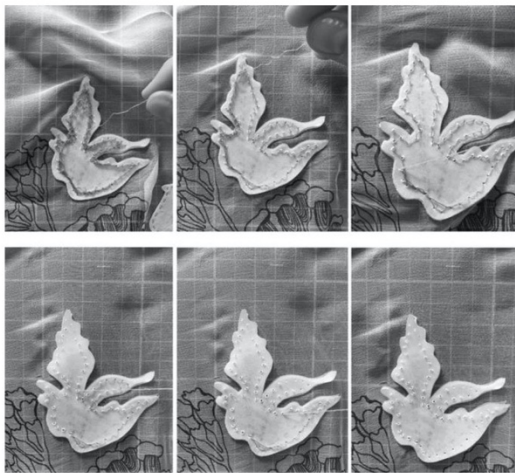


Figure 3. Unravelling crochet. Photographs by author.

3.2 The ritualization of the participant's behaviour

Ritualizing the participant's behaviour implies assigning ritual qualities to the participant's behaviour by designing: interactions that happen repeatedly (each artefact comes with a various loose fragments which participants can add/remove from the background panel), interactions that have meaning (the story of the NBBTFB is communicated by printing it on a piece of paper that is then packed with the artefact), and interactions that happen according to a prescribed set of actions (the participants were given descriptions of what the interaction entailed which served as directions on how to interact with the artefacts).

3.3 The strengthening of the conceptual link to the model

In this research, the link to the NBBTFB is not practical but conceptual. While the bird performs the behaviour with a practical goal (i.e., creating a healthier environment for the eggs and the chicks), the participants' engagement in this type of behaviour has a different purpose. The goal is not to make the environment healthier but to design a type of behaviour that triggers awareness about the health of the domestic space.

In order to strengthen in the participant's mind the connection between the bird behaviour and their behaviour I incorporated fragments infused with essential oils of lavender (*Lavandula Officinalis*) and peppermint (*Mentha Piperita*) in the design of artefacts, and I imagined the home as a metaphor for the nest. Thus, through the use of particular imagery, and of craft materials and processes the samples and artefacts acquire craft qualities similar to the bird's environment.

3.4 Making the textile samples and artefacts

The making process is characterized by what Ingold (2014) calls 'intuition in action'. In this research, the making process is fluid and every decision (such as using a particular process or material) is a response to what is happening at the moment with just few changes. This new knowledge created is previous knowledge that has been developed and taken new forms, by being applied in different ways as a response to the engagement with materials.

The majority of materials used are made of 100% natural fibers (Fig. 4). They include well-known fabrics and papers such as unbleached cotton, Belgian linen, silk gauze and Arches paper, and specialty materials, such as linen paper, fabrics made of banana fiber or pineapple fiber, and handmade recycled paper. Throughout, a mixed-media approach is emphasized. The choice of materials is influenced by their physical properties and their aesthetic qualities.

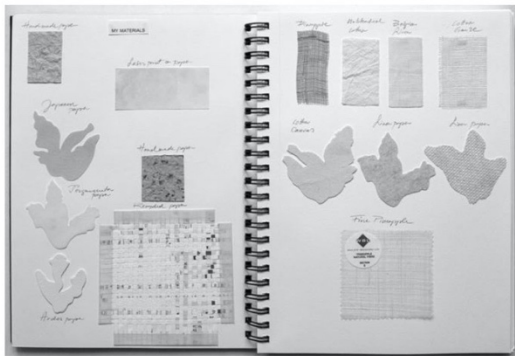


Figure 4. Materials used in the making of the artefacts. Photograph by author.

The making involves a combination of hand-made processes, mostly screen print, stitch, crochet, and digital processes, such as digital print. Even though there is a mix of hand techniques and digital processes, throughout, hand-making is used as a predominant mode of production (Fig. 5).

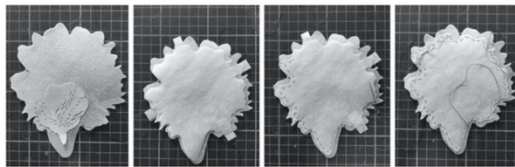


Figure 5. The making of a loose fragment for one of the artefacts involving stitching. Photographs by author.

Due to working with inspiration from nature, the choice of materials and processes is also influenced by the preventative approach which is characteristic to nature. In that respect, I attempt to create artefacts that do not cause harm to the environment in which they are placed, and to reduce as possible the negative effects the materials and processes used might have on the environment.

3.5 Home Pharmacy

The first domestic artefact, Home Pharmacy (Fig. 6) was designed as a kit, made of a background panel and loose fragments impregnated with essential oils, that the participant needs to add to or remove from the background panel. The artefact is representative for the other seven interactive textile artefacts that require ritualistic engagement with the participants and that release essential oils as a result of that engagement.



Figure 6. Home Pharmacy. Photographs by Cristina Schek.

4 TESTING AND ANALYSING

The textile artefacts were tested during two adoption experiments in order to identify: if a bioinspired ritual was generated around them, and if engagement with artefacts could raise participants' awareness about the home environment with a focus on air quality.

In addition, the testing was also aimed at: identifying any additional role(s) the artefacts might have, receiving feedback on the design of artefacts, and identifying any issues that arose in the application of the adoption method. In this sense, AE1 served as a pilot as well.

4.1 Adoption method

I utilised Dunne & Raby's (2001) adoption method used in their experimental 'Placebo' Project. The method involves participants volunteering to having an object in the home for a certain period of time at the end of which data is collected through interviewing.

In my study: 1) nine participants volunteered to take part; 2) the artefacts were in the participants' homes for a period of two weeks, time during which participants were invited to install the artefact, engage with it, record the engagement, and take one photograph of the artefact while installed in the home; and 3) data was collected through interviews and journals at the end of the two weeks.

4.2 Adoption experiments

I undertook two adoption experiments. AE1 took place in August – September 2017, and three artefacts were given for adoption during it. AE2 took place in January – February 2018, and six artefacts were given for adoption during it.

4.3 Adoption package

Each participant was given an adoption package. Inside each package (Fig. 7), I included the artefact, accompanied by everything needed for hanging it on the wall, directions for interacting with it, a journal in which to record the interactions with it and a print with the story of the NBBTFB.



Figure 7. Contents of the adoption package. Photographs by author.

4.4 Tentative hypothesis

This is an open-ended exploratory study that applies inductive reasoning, which tests a tentative hypothesis in order to develop conclusions. The tentative hypothesis is as follows:

If participants engage (actively interact) with the textile artefacts, and are in this way replicating the ritualistic NBBTFB that exists in nature that has to do with maintain a healthy environment, and they are made aware of this behaviour, and if the textile artefacts use essential oils as part of their design and have particular craft qualities *then* a bioinspired ritual could emerge and the textile artefacts could contribute to raising participants' awareness about the health of the home environment with a focus on air quality.

4.5 Data collection methods

The interviews were semi-structured (Kvale 2009) with open-ended questions. There was a mix of factual questions and opinion-seeking questions.

The three interviews at the end of the first adoption period took place via SKYPE. The six interviews at the end of the second adoption period were in person. All interviews were 45 minutes to 1 hour in average and were audio recorded. The procedure for transcribing did not involve

transcribing the interviews verbatim, instead the interviews were transformed into a written style.

The journals functioned as logs, and provided another way, in addition to the interviews, to identify if a domestic ritual framed temporarily was established.

4.5.1 Operationalizing the concept of DAP at home

As a way to gather insight into the level of awareness about air quality, prior to interviewing participants I operationalized (Psychology 2018) the concept of 'air pollution at home'. Using a social media platform (i.e., Facebook Messenger) I undertook a study in which I asked twelve of my contacts to name five actions that make them aware of the level of air pollution in the home. Dusting the home, ventilating it, the presence of mould and mildew, the presence of fumes produced while cookings and the use of cleaning supplies were most often associated with air quality. As a result, during the interviews I asked questions such as 'how much attention did you pay to dusting the home during the two week you had the artefact in the home?', 'how much attention did you pay when using cleaning supplies?', and 'how often did you ventilate your home in the two week you had the artefact in your home?'.

4.6 The process of data analysis

The key activities in the textual data analysis from journals and interviews included data reduction, data display and drawing conclusions (Miles & Huberman 1994). Data reduction involved clustering textual data around each aspect I investigate (i.e., the potential that artefacts have in generating a new domestic ritual), coding data line-by-line manually using tools such as underlining that selected data related to the aspect I investigate, extracting the words and/or sentences underlined, and using tools such as note taking to organize the data clustered around each aspect I investigate. Data display involved using structures that present data in an organized and compressed visual format. For drawing conclusions, I used questioning as an intellectual tool to interrogate data.

4.7 Findings

A bioinspired domestic ritual emerged.

Engagement with the artefacts contributed to raising participant's awareness about the health of the home environment with a focus on air quality. Other factors that contributed to that were: an

awareness about the bird story which explains why the artefacts required this type of engagement, and the use of loose fragments impregnated with essential oils in the design of artefact as replicas of the plant fragments the bird is bringing into its nest.

Another role the artefacts played was to promote well-being at home by bringing about relaxation and relieving stress, due to the slow nature of the interactions, the discrete scent of essential oils, and the craft qualities of the artefacts.

These claims about the textile artefacts are not generalizable claims, as only a small number of artefacts were tested.

Last, the recruitment process utilized in AE1 (i.e., three random acquaintances were asked in person if they would be interested in taking part in the research study and provided with the Participation Information sheet) needed to be changed for AE2. During AE1 exposure to the artifact (which could lead to engagement with the artefact, and it is therefore vital to the study) was limited due to the participants' busy schedules. Thus, for AE2 a new recruitment process was implemented which allowed to select participants based on their availability during the two weeks they had the artefact in their home. The new process involved an Adoption Form which interested participants were required to fill out once they communicated their interest in taking part in the study.

5 CONCLUSIONS

This research reveals the importance of using bioinspiration in designing for better homes. Because nature works with a preventative approach in mind, mimicking a behavior from nature leads to promoting a type of behavior that focuses on the causes of the problem, instead of dealing with diminishing the problem. The type of behaviour that the participants are mimicking is an example of an active behaviour that focuses on creating a healthy environment. In addition, the approach does not emphasize DAP as a problem, and therefore it inspires people to improve their home without making them anxious.

The common way in which raising awareness days, art & design projects, mass-media campaigns, and public lectures make people aware about an issue is by illustrating the negative impact they can have on human health. This not only brings with itself anxiety, but it can backfire, making one more prone to favor the issue. Here, the approach utilized (i.e., ritualistic engagement mimicking a healthy behaviour) brings with itself relaxation, and contributes to their well-being. In addition, by assigning ritual qualities to the interactions, the artefacts have the potential to turn the behavior into a permanent one.

Last, the research emphasizes the importance of craft, hand-making and an overall low-tech mode of production in the creation of everyday domestic products, as a way to create sustainable products, that not only do not harm the environment through their making, but are also enduring through their craft qualities (Walker 2017).

ACKNOWLEDGEMENTS

I thank the nine participants that volunteered to take part in this study.

REFERENCES

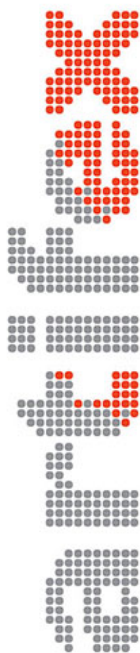
- Bell, C. 2007. *Ritual: perspectives and dimensions*. New York: Oxford University Press.
- Dunne, A. & Raby, F. 2001. *Design noir: the secret life of electronic objects*. Basel: Birkhauser; London: August Media.
- EC SCHER. 2007. *Opinion on risk assessment on indoor air quality*. Available from: http://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_055.pdf.
- Ingold, T. 2013. *Making: anthropology, archeology, art and architecture*. London: Routledge.
- Kvale, S. 2009. *InterViews: learning the craft of qualitative research interviewing*. 2nd ed. London: SAGE.
- Mennerat, A.I., Mirleau, P., Blondel, P. & Perr, K. 2009. Aromatic plants in nests of the blue tit *Cyanistes Caeruleus* protect chicks from bacteria. *Oecologia* 161(4): 849-855.
- Miles, M. B. & Huberman, A. M. 1994. *Qualitative data analysis*. London: SAGE.
- Moore, S.F. & Myerhoff, B.G. eds. 1977. *Secular ritual: a working definition of ritual*. Amsterdam: Van Gorcum.
- Ozenc, F. K. 2014. Modes of transition: designing interactive products for harmony and well-being. *Design Issues* vol. 30 (2), pp. 30-41.
- Psychology 2018. *Operationalization*. Available from: <https://psychology.iresearchnet.com/social-psychology/social-psychology-research-methods/operationalization/>.
- Shedroff, N. 2001. *Experience design 1*. Indianapolis: New Riders Publishing.
- Sorensen, J. 2005. Ritual as action and symbolic expression. In: E. Ostrem, M. B. Bruun, N. H. Petersen & J. Fleischer (eds) *Genre and ritual: the cultural heritage of medieval rituals*: 49-64. Copenhagen: Museum Tusculanum Press.
- Stephenson, B. 2015. *Ritual: a very short introduction*. New York: Oxford University Press.
- US EPA. 2018. *Indoor air quality*. Available from: <https://www.epa.gov/indoor-air-quality-iaq>.
- Whitesides, G.M. 2015. Bioinspiration: something for everyone. *Interface Focus* 5 (4): 1-10.
- Walker, S. 2017. *Design for life: creating meaning in a distracted world*. New York: Routledge.
- WHO. 2009. *WHO Guidelines for indoor air quality: dampness and mold report*. Available from:

http://www.euro.who.int/__data/assets/pdf_file/0017/43325/E92645.pdf.
WHO. 2010. *WHO Guidelines for indoor air quality: selected pollutants*. Available from:
http://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf.



Vilniaus
dailės
akademija

Elena Brebenel (CA)



Bio-inspired Craft

Biologinių procesų įkvėpti amatai

04 24-05 11
2019

Parodą remia | With the support of



TEKSTILĖS
GALERIJA-
DIRBTUVĖ
TEXTILE GALLERY-STUDIO

www.artextile.lt

DARBO LAIKAS:

• 12-18 val.
• 12-16 val.

ADRESAS: GAONO G. 1

X 2.2 Exhibition Documentation

