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The Translocal Event and the Polyrhythmic Diagram

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Abstract

This thesis identifies and analyses the key creative protocols in translocal performance practice, and ends with suggestions for new forms of transversal live and mediated performance practice, informed by theory. It argues that ontologies of *emergence* in dynamic systems nourish contemporary practice in the digital arts. Feedback in self-organised, recursive systems and organisms elicit change, and change transforms. The arguments trace concepts from chaos and complexity theory to virtual multiplicity, relationality, intuition and individuation (in the work of Bergson, Deleuze, Guattari, Simondon, Massumi, and other process theorists). It then examines the intersection of methodologies in philosophy, science and art and the radical contingencies implicit in the technicity of real-time, collaborative composition. Simultaneous forces or tendencies such as perception/memory, content/expression and instinct/intellect produce composites (experience, meaning, and intuition- respectively) that affect the sensation of interplay. The translocal event is itself a diagram - an interstice between the forces of the local and the global, between the tendencies of the individual and the collective. The translocal is a point of reference for exploring the distribution of affect, parameters of control and emergent aesthetics. Translocal interplay, enabled by digital technologies and network protocols, is ontogenetic and autopoietic; diagrammatic and synaesthetic; intuitive and transductive. KeyWorx is a software application developed for real-time, distributed, multimodal media processing. As a technological tool created by artists, KeyWorx supports this intuitive type of creative experience: a real-time, translocal “jamming” that transduces the lived experience of a “biogram,” a synaesthetic hinge-dimension. The emerging aesthetics are processual - intuitive, diagrammatic and transversal.

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Preface

My career as an artist and musician was established on a professional basis in the 1970s. For the past few decades, however, I have considered my main art form to be the online environment where social space is mediated and recreated by collaborative use of new media tools. I am therefore a hybrid scholar: a practicing artist in LiveArt genre, and a creator of technology tools that enable translocal interplay.

My chosen field is itself “emergent” in two senses: it has been emerging onto the social landscape of the Internet, in unplanned and uncharted ways; while it has also been making its slow but steady mark on the landscape of worldwide academia, where studies in the field of new media have only recently been recognised as important contributions to the scholarship of media and culture. My method of making practice-based live and online netart is also a relatively recent one. There were few parallel projects running when I began the work which underlies this thesis, though there are now many more.

I might have chosen to submit a body of practical work – live performance scripts and documentation of that live work, online jams in DVD format, et al – and indeed I did originally intend to submit that practical work in partial fulfillment of this degree. While that large body of work underpins this thesis, and while I could not have reached the same scholarly level without having made that artwork, I decided to take up a greater challenge of presenting the new and emergent ideas raised by the practical work, rather than the body of work itself. I therefore refer to my practice, and the practice of many other artists, throughout. But the thesis is intended to stand on its own as a major contribution to scholarship, readable in text format and can therefore be archived and referenced in a manner that ephemeral, real time networked art is not.

I intend through this thesis to make a major contribution to the fields of New Media Performance, both in practice and theory, and to offer a new paradigm for an emerging theory of the translocal, based upon my career of professional practice. The thesis is inclusive of documentation of a major collaborative performance event and extensive interviews with artist practitioners. The KeyWorx research discussed herein represents a philosophical shift in considering how new media tools can instigate as well as represent and respond to the artistic and intuitive methods and theoretical aims of current and future media practice.

INTRODUCTION

A concept is by nature connectable to other concepts. A concept is defined less by semantic content than by the regularities of connection that have been established between it and other concepts: its rhythm of arrival and departure in the flow of thought and language; when and how it tends to relay another concept. When you uproot a concept from its network of systemic connections with other concepts you still have connectability. You have a systemic connectability without the system. (Massumi, 2002a, 20)

This research project explores creative processes. Investigates process theories and processual practices within what can be called an *emergence paradigm* generated from networks of dynamic systemic concepts. Ontogenetic processes facilitate the unstable; are predisposed to tango with the indeterminate from a decentred in-between; are on the move. This research, itself a long-term process, shares many of the characteristics and properties it examines. Concepts develop; concepts connect, couple and hinge; concepts unhinge, reconnect and dissolve. This systemic connectability is a feedback loop, a strange-loop, a möbius strip whose beginning and end disappear into it's own blurred distinction between inside and outside, virtual and actual, theory and practice, beginning and end. The concepts offered here engender a contiguous enfolding/unfolding of problematising, differentiating and temporalising in a manner and method influenced by Henri Bergson's recipe for intuitive conceptualizing (Deleuze, 1991). They focus on the dynamic interrelation of relations, on in-betweenness, on potential, opening conditions of possibility that further the questioning of contemporary practice-based theory in new media arts as it unpacks the performative experience of collaborative composition. A transductive, performative intuition will be pursued.

The issues presented here probe the ontogenesis of creativity and the nature of the embodied experience of that process. They encompass the malleability of the digital artefact and its transductive code, but more consequently, in this research, they focus on the incipient, affective experience engendered through the multi-maker composition; of the temporal processes and reflexive situatedness of dynamic (ex)change; of the relationality of *eventness* and the movement of continuous making. The creative production investigated here, pushes beyond the vulnerable scaffolding of the subjective to embrace the *production of subjectivity* that is aesthetic (Guattari, 1991), autopoietic (Varela, Deleuze and Guattari; Massumi) transindividual (Simondon) and intersensory (Massumi). It emerges in the incorporeal dimension of the body outlined by Deleuze and Guattari and re-imagined by Massumi (2002) as the *biogram*.

Processual subjectivity in the situatedness of the collaborative composition is the timeless, saturated potential of the bifurcating *event* that is *emergence*, that is phase shift, that *is* the creative. It estimates its relationality through movement in its “zone of indetermination” which Bergson claims “allows, then, of an a priori estimate of the number and the distance of the things with which it is in relation” (Bergson, 1990, 32). This is a focal point. “Call the openness of an interaction to being affected by something new in a way that qualitatively changes its dynamic *relationality*” (Massumi, 2002a, 224). Our vantage point is the relationality and contingency of the “event” in the co-operative, aesthetic production of a performance. According to Massumi the event can be described as:

[...] the interval of change, the in-itself of transformation [...] a time-form from which the passing present is excluded and which, for that very reason, is as future as it is past, looping directly from one to the other. It is the immediate proximity of before and after. (2002, 58)

The event is a non-present ‘now’, a paradoxically empty interval, overfull with potential, of past becoming future becoming past. Its simultaneous directionality is isomorphic to *intuitive* movement between the thought passages of instinct and intellect, each traversing opposite directions (Bergson, 1911, 176).

The asymmetrical differentiating of time and space, of virtual and actual are fundamental concepts explicitly explored in relation to the KeyWorx technological platform central to this research. As a technology designed to enable translocal composition between participating artists, an understanding of the broader context is essential. Terms and neologisms will surface: event, affect, diagram, transduction, transversal, biogram, indeterminacy, synaesthesia, individuation, haecceity, improvisation - some important, others passing linguistic gestures in the arrivals and departures of variegated concepts.

The term *translocal*, in this project, is multi-faceted. Though not a commonly used term, it has a certain cache within locative media arts and distributed performance networks. In particular, it distinguishes itself from the telematic, telepresent and telecommunications genres with its philosophical insistence on the “trans” (across, or dynamic movement of crossing) as a preferable prefix to the “tele” (at a distance). In this research it affects a multiplicity of meaning and is itself a diagrammatic term:

- the translocal as the diagrammatic interstice between the simultaneously directional forces of the local and the global; between the forces

or tendencies of the individual and the collective, the absolute and the relative, chance and choice

- the translocal as an ethical, political and aesthetic fold, a *chaosmos*
- the translocal as a modulating deviation of the nonlocal
- the translocal as a genre of performance practice that utilises technological and social protocols of distributed networks to explore relationality
- the translocal as a dynamic interval of spatial representation; the in-betweenness of absolute (allocentric) and relative (egocentric) “positioning”; of Euclidean and non-Euclidean spatial perception

The term *polyrhythmic*^c, in this thesis, evokes a nuanced rendering of complex structures; pushes the singular rhythm of Deleuze and Guattari to its logical transversal conclusion. West African and Cuban music (Chernoff, 1979) are best known for the prolific use of layered metrical difference and complicated patterns (two against three, three against four, etc.). The polyrhythm is an interlocking multiplicity, a *felt* virtuality, and an emerging “edge of chaos.”

In such music, the conflicting rhythmic patterns and accents are called cross-rhythms. The diverse rhythms establish themselves in intricate and changing relationships to each other analogously to the way that tones establish harmony in Western music. The effect of polymetric music is as if the different rhythms were competing for our attention. No sooner do we grasp one rhythm than we lose track of it and hear another [...] it is not easy to find any constant beat at all. The Western conception of a main beat or pulse seems to disappear, and a Westerner who cannot appreciate the rhythmic complications and who maintains his habitual listening orientation quite simply gets lost. (Ibid, 46-7)

Polyrhythms are entered as one enters or intersects multiple durations. One intersects those rhythmic durations through intuition.

This project is structured in three Parts that swing as passageways between Hinge documents. The Hinges describe the KeyWorx technology, the research model of my practice as a media artist/software developer. They are called Hinges rather than chapters because they *are* the intuiting by which the theory in the chapters was actualised. They represent the making and use of KeyWorx as artistic practice, instantiating an intuition of relationality, of the diagram, of the primacy of process, of affective ‘space’, of synaesthesia.

Practice-based Research and the Lure of Collaborative Creative Processes

After migrating from the Fine Arts to the Philosophy department during my undergraduate study, I eventually re-situated myself in the Fine Art department in my third year, anxious to pursue research into the then emerging genre of “conceptual art.” As a creative trajectory, it suited my diverse interests and fascinations. Since graduating with a BA in Fine Arts in 1972, I have been an interdisciplinary art-worker in a variety of genres: sculpture, sound art, art/rock, scenography, graphic design, interactive performance, software development and the written word. Unilateral focus has not been my inclination. I tend toward nomadic conceptualising in sensible footwear.

In 1974, disoriented by the exigencies of a conceptual career, I formed a band with a group of three friends in Chicago⁶. Daily rehearsals, composing, recording and weekly gigging absorbed most of my creative energy for nine years. It was during this period that I learned about collaboration: negotiable (political) tendencies in collective creative processes, intuitive improvisation, aléatoric composition, performative contingencies, audience variables and transductive becomings. Cage, Oliveros, Chicago's AACM, Duchamp, Brook, Proust, Bateson and Gertrude Stein as well as the growing ranks of performance artists such as Marina Abramovic and Ulay, Acconci, Naumann, Monk and Burden all exerted a strong influence in that formative decade. Pursuing palpably impalpable transits through the zones of indeterminacy, through differencing and repetition, has been a focus ever since.

This doctoral research modulates through various domains, arriving and departing dense, complex territories with a fluctuating yet persistent rhythm. It has, over time, provided me with a lexicon of terms and concepts that come close to expressing the processes and sensations of real time multi-maker creation. Just as creative processes are dynamic and nonrepresentational, this process is rife with semantic representation, caught in its own phase-shift from emergent thought to re-articulation. This practice-based theoretical/concept-making evokes both an intuitive and a derivative expression of *eventness* that nonetheless resonates something of its elusive, dynamic nature.

A long-term research question pervades: **How are the sensations of creative processes generated, transformed and distributed between the co-makers? How might an ontology of collective creative practice emerge from translocal “jamming”?**

I began this study in search of a self-organising structure. Complexity theory and network theory were appropriate to the technology we were developing at Waag Society in the late '90's. Distributed, multi-player interaction was the domain. Parallel to network theories, I was reading Andy Clark's view of contemporary cognitive science (1997), complexity theory (Waldrup, Wolfram) and Hayles' history of cybernetics (1999), which thematically intersected with an exploration of autopoietic processes and Varela's later neurophenomenological investigations (1993). From daily observations of KeyWorx interplay, the persistent issues of *control* and *chance* intrigued me. Co-operation and shared sensation appeared, in this context, to be a socially situated, synaesthetic affect. Hardware, software and wetware in transductive resonance. My research inched from a fascination with structurally coupled 'closed' autopoietic living systems (organisms) to Deleuze and Guattari's open-ended, virtual Body without Organs (1987)⁷. The conditions of experience in distributed, mediated, KeyWorx performance were sympathetic to both perspectives. I was intrigued to find Deleuze and Guattari alluding to autopoietic processes and followed that trail. This vector challenged the structural leanings and proved to be more potent. The multi-maker compositions I have witnessed and participated in have tapped the affective experience of virtual dimensionality. They have, often in a sustained manner, accessed creativity that is contiguous with a social function, with a transductive⁸ processual production of subjectivity and collectivity. This is a potent composite.

Intuition, as a Bergsonian/Deleuzian "methodology" offers a framework for this project. As a mode of thought, rigorous yet differentiated from intellect, it is extended to portray the engagement of performers in translocal event dimensions. The term "translocal" is itself a loaded neologism. It takes flight from the original two-dimensional "telematic" reference to screen-based video transmissions to emerge as the relation of diagrammatic event potential; the polyrhythmic rupture between the directional forces of local and global; politically, socially and aesthetically. It complexifies as it intersects with other forces or tendencies: content and expression, perception and memory, absolute and relative, indeterminate and determinant, chance and choice, molecular and molar, amodal and modal specificity, etc. These dualisms are closer to energetic forces, purely different in kind, that simultaneously fold as unities as they divide and multiply as multiplicities⁹. "Meaning" emerges from the *translocal event* as the movement of fractal plurality in the interval, the being of an interrelation as "non-relation".¹⁰

KeyWorx Synaesthetic Practice

The systemic organisation of KeyWorx facilitated translocal performance involves a distributed multimedia, multi-channel, multi-player field of potential. KeyWorx interplay paradoxically locates (packets blitzing thru Internet protocols) as it simultaneously collapses position to a shared surface, at once “real but abstract,” a recursive, autopoietic actual-becoming-virtual-becoming-actual. That shared space of the monitor surface, the interface to the field of play or “plane of composition” to use Deleuze and Guattarian terms sustains a resemblance to Raymond Ruyer’s notion of absolute survey, a dimensionless percept of the visual field that is always spatially embodied, “the ‘I-unity’ to the subjective sensation of the visual field” (Deleuze and Guattari, 1994, ix).¹¹ The problem of incorporeal materialism, situated in digitally realised performance practice, is taken up at length in these pages.

In 1998, when I began working on KeyWorx with my colleagues at Waag Society, I was curious about synaesthetic experience and wondered if it was applicable to “clinical” synaesthetes alone. Working for years as an artist with real time¹² processing of sound and image, I began to feel that my sensation of discrete modalities was changing. Perhaps it was the conscious recognition of modalities (particularly sight and sound) through control of their variable parameters and the transformative qualities of their combinations that stimulated this reflection. For several months I lurked on a synaesthesia mailing list and observed how “pathological” synaesthetes described their experiences. At that time I could find little scientific validation that synaesthesia could be “learned” (through, for example, daily digital arts processing) or “latent.” I have, in the past few years, noted the frequency with which synaesthesia is alluded to as an important research area, having lost its aura of mystical non-sense. Recent theories from scientists Ramachandran and Hubbard (2001) that synaesthesia is *normatively* genetic and in their view, responsible for the evolution of spoken language in humans, have given the subject a certain credibility beyond the bizarre. Research by Cytowic (1995; 2002), Baron-Cohen (1996) and Harrison (2001) add weight to the synaesthetic debate. Massumi’s synergetic mix of the visual and the proprioceptive caught my attention as it resonates with my experience of both KeyWorx practice and embodied affect(s) in dance and new media performance practice.

This biagrammatic concept is the synaesthetic extension of a diagram, evocative of the double articulations between forms of content and forms of expression¹³ (Deleuze and Guattari, 1987, 43-5); a diagrammatic/bio-grammatic hybrid reflecting the experience of a fully actualised KeyWorx session between two or more ‘distant’

participants. The embodied enaction, enabled by the technological interface between virtual-actual, presence-absence and cooperation-control is immanent to the interplay. I looked for concepts that resonate with this practice. I found them in Bergson. I followed their dissemination and transformation in Deleuze, Guattari, Delanda, Massumi, Hansen, Mackenzie, Simondon, Wolfe, Murphie and Grosz in the discourse of virtuality, affect, sensation, intuition, transduction and individuation. Massumi has had the deepest influence.

The aim of this thesis is to explore, via performance practice, the ontogenetic processes of becoming: including movement, intuition, transduction, composition and improvisation (all of which figure significantly in this approach). The investigation tackles the 'new' from a distributed perspective that considers complex networks of multiplicities; considers the diachronic emergence of unpredictable properties; considers "unknown unknowns" (Hayles, 2004).¹⁴ The interrelation of relations is a focal point, as is the sidestepping of teleological and hierarchical schemas of creative production.

The Thesis: *Multi-maker composition situated in the event-potential of translocal performance transduces, through polyrhythmic, transversal processes, the lived experience of a "biogram", a diagrammatic, synaesthetic hinge-dimension. Though the emerging aesthetics in this confluence of conditions is a rare event, like the effective movement of intuition itself, its potential is apparent.*

Structure and Organisation

Part One: The Emergence Paradigm - presents an overview of systems theories and conditions of emergence. It introduces the Bergsonian legacy extant today in Deleuzian and post-Deleuzian discourse and lays the systemic groundwork for the concepts to follow. Philosophers have been influenced by variants of 19th and 20th century systems science; chaos theory, catastrophe theory, complexity theory, dissipative systems theory, quantum theory. This section establishes relationships between science and an empirical, material 'metaphysics' threaded throughout this research.

Hinge I - What is KeyWorx? Outlines the conceptual precedents of the R&D project from 1998 to the present. Additional historical descriptions of concepts, functionality and collaborative working methods are established.

Part Two: Modes of Creative Thought: Mind the Gap explores intuition as a process and a methodology, distinguishing between philosophical and scientific approaches to the “interval” (cognitive, affective). This is not an arbitrary distinction as Deleuze and Guattari have staked a significant claim in differentiating philosophical, scientific and artistic processes. Chapter Three outlines a Bergson/Deleuzian approach to creative thought. Chapter Four looks at neurophysiological research exploring the “readiness potential” of the half-second cognitive interval. Both approaches to the cognitive interval deal with issues of free will and the being of consciousness.

Hinge II: Interfacing Realities/Artist Documentation is a record by participating artists Michelle Teran and Isabelle Jenniches of a three week process of making. It is a description of a formative process of control in aesthetic choice-making. As a documentation of a creative process it demonstrates the structure and contingencies of multi-maker, interauthored work. There are full-color images in the section from preparatory rehearsal sessions and a sequences screen shots from the actual performance at DEAF03.

Part Three: Modes of Creative Thought: Interplay and Composition is the unfolding of creative process in performance practice. It looks at play, interplay, improvisation, aléatoric and indeterminate composition in performing arts practice. This investigation intersects with processes of intuition, transduction and individuation examined earlier. It undertakes an analysis of KeyWorx performativity as diagrammatic. It furthers that argument by concluding that KeyWorx composing is biogrammatic, after Massumi’s formulation.

Conclusions: wraps a systemic coherence into the connectivity of the concepts, evaluates the experience of KeyWorx artists and suggests future research vectors.

Appendices - excerpts from “The KeyWorx Interviews”

Part One – The Emergence Paradigm

In the posthuman view [...] conscious agency has never been “in control”. In fact the very illusion of control bespeaks a fundamental ignorance about the nature of the emergent processes through which consciousness, the organism, and the environment are constituted. Mastery through the exercise of autonomous will is merely the story consciousness tells itself to explain results that actually come about through chaotic dynamics and emergent structures [...] emergence replaces teleology; reflexivity replaces objectivism; distributed cognition replaces autonomous will; embodiment replaces a body seen as a support system for the mind; and a dynamic partnership between humans and intelligent machines replaces the liberal humanist subject’s manifest destiny to dominate and control nature [...] the distributed cognition of the emergent human subject correlates with -in Bateson’s phrase, becomes a metaphor for,- the distributed cognitive system as a whole, in which “thinking” is done by both human and nonhuman actors. (Hayles, 1999, 288)

Introduction

In *How We Became Posthuman*, N. Katherine Hayles embarks on a comprehensive interpretation of the history of cybernetics, transiting from the first Macy Conference¹⁵ in 1946 towards a contemporary appraisal of embodied “emergence” in a posthuman ecosphere. She identifies three successive waves in the historical march to the posthuman: the initial informationally structured (homeostatic) era with its productive run from 1946 to 1960; the recursive, self-organisational wave that fomented and peaked between 1960–1985; and the *virtually* open-ended third wave which is very present in contemporary theory and practice (1999, 16). As Hayles tells it, in a posthuman paradigm what we know and how we know it is a fluid, distributed, indeterminate interaction between human and nonhuman actors in a dynamic, emerging ecology. From this perspective, a topological map of intersecting complexities and distinguishable multiplicities can be imagined. Proximally situated near the epistemological precedents of constructivism and radical empiricism, the ontological mapping of this posthuman premise is a variegated skein of relationality; a cartography of the conditions of emerging emergence. The posthuman is passage of movement through its own indeterminacy. And, “Indeterminacy and determination, change and freeze-framing, go together. They are inseparable and always actually coincide while remaining disjunctive in their modes of reality” (Massumi, 2002a, 8). The posthuman constitutes an ontogenetic domain consistent with its thesis. A process of becoming-other.

Early proponents of what might be called a real empirical, material, processual philosophy were Bergson, James and Whitehead, followed most visibly, in this study, by Simondon, Deleuze and Guattari, Massumi, Mackenzie and Grosz. The recipe

that purées the thought presented here is based on two ingredients, two dynamic terms that propagate a rhizomatic propensity, multiple lines of flight: *potentiality* and *relationality*. Blend the movement of these terms with ontologies that envelop (in)corporeality, virtuality, creativity and technicity and all that follows is underscored.

Systems theory, in various forms and guises emanating from general systems theory (GST) towards theories of autopoiesis, “far from equilibrium” thermodynamics, complexity theory and quantum physics, offers ideologies and methodologies for exploring the conditions of being and becoming; for illuminating, if fleetingly, emergent potential and the processes by which the ‘new’ arrives. Systems theory is the transparent dynamical ground of this research project. It unfolds a complex of isomorphic relations and paradoxical disjunctions that co-exist within an expansive context from which to approach a discussion of collaborative practices in new media and LiveArt enabled by information technologies. The breadth of the catalysis¹⁶ is precisely its purpose. *It is complex*. The subject cannot be approached reductively without first cutting a wide transdisciplinary swathe of contextuality; identifying the transcontextual. It requires a method that is as fluid as its objective. Though some process lines will be in pinpoint focus, the thesis is situated in the broader field that generates it. That focus is inclusive of praxis that extends well beyond the conventions of working relationships in inter(trans)disciplinary arts projects. It moves towards a synergy that reveals individual contribution within a social phase space of relational dynamics, strange attractors and the emergent potential of interconnected agency. These processes flourish from diversity among its group and difference among its elements. But it is not the component elements that are explicitly explored here, it is the relations between them. What might the dynamic, multi-maker modalities of artistic expression in ‘posthuman’ domains that include human and non-human interaction be? How might biological, social and technical relations in 21st century artistic processes be described? These sweeping questions drive this enquiry.

This project then, will investigate the *conditions of experience* (Deleuze, 1991) of HCHI (human-computer-human-interaction) between practicing artists in a performance-oriented framework. This framework, though technology specific, has many analogies to complementary fields of practice such as social interaction and creative play in gaming cultures, both digital and analog, and improvisatory expression in the performing arts (music, dance, theater). Indeed, translocal (or nonlocal) improvisation, or what will be called “composition” in a Deleuzian context, is, as this research hopes to elucidate, a barometer of the processual, ethico-aesthetic set

out by Deleuze and Guattari in their last collaboration, *What is Philosophy?* (1994) and further elaborated on by Guattari in *Chaosmosis* (1995). It provides grounds for critique in comparing Deleuze and Guattari's disciplinary boundaries to Simondon's inclusive notion of transductive 'technicity'. These associations are complicated by their intersection with embodied¹⁷ enaction, discernable in Bergson, defined by Varela and apparent in the contemporary reflections of Massumi, Mackenzie, Grosz, Hansen and Hayles among many others. Comparing second-order cybernetic systems (synchronic emergence models) and virtual multiplicities (emergent diachronic becomings) as adapted by Deleuze and others from their Bergsonian origins into a posthumanist intersect is potentially fraught with ontological inconsistencies and ruptures, and yet the crossing pathways make for an intriguing navigation.

Distributed real time interaction strategies and negotiations for data sharing and synchronous exchange are examples of dynamic systems with a high degree of complexity. In the following chapters, relevant issues and phenomena that address emergent behavior within user groups that are connected and facilitated by digital (malleable) media will be pointed to. This global view unpacks to compare divergent vectors with core affiliations to systems theory principles that infiltrate performance-oriented network art. One vector, popular in HCI research, investigates intersubjective experience, intentionality, presence and the "construction" of meaning from decidedly phenomenologically influenced perspectives. The other vector posits the nomadic articulations of virtual becomings, "catalytic fusions" and transitional fringes of relational "compositions" (Massumi, 2002a, 174). In an ironic confluence of divergent terminologies, certain questions surface: How is creative expression in-corporeally embodied in translocal interaction? And, what are the conditions of emergent experience in aesthetically charged, mediated interplay?

Complexity theory begins the story. It supports the promise of a relational framework for bouncing off a babel of confounding terminologies and jargon into a comprehensive (if, by description, incomplete) structure to accommodate the historical perspectives of Bergson's "duration" and Maturana and Varela's "autopoietic" systems theory and their respective progeny. The journey through the immanent and the extensive, the virtual and the actual, the structure and its organisation is a recursive one. It seeks to avoid Hegelian synthesis as it deploys a non-dialectical Intuitive method. The tangents will divide and double and differentiate until the research itself, in collusion with its thesis, reaches its own "edge of chaos" and becomes its praxis.

Chapter One

The Primacy of Process: Emergent Systems and Multiplicities

The transdisciplinary current of complex system theory has been running through and between diverse fields of research practice in the past few decades. The hard and soft sciences, philosophy and the arts have all felt the drift and surge of its pull. Though interpretations and qualifications vary between fields, there is an appetite for models and methodologies that reveal elements and conditions of non-linear dynamic relations in systems; in cells, in brains, in social networks, in aesthetic production and human-computer-human interaction. This style of research studies the organisation and relational interaction between systems, their environments, and the processes and practices that emerge from shared conditions. For some, complexity represents the grand quest for the connective tissue to bind together a holistic theory of everything. For others, complexity itself circumvents any reductive understanding of its processes, yet offers a scientific and philosophical basis for an indeterminate, unpredictable world. It manifests methodologies that invert the positivist, reductionist approach of science by opening outwards towards the multiplying relationality of things in co-operative ecological systems. It is not reductionist but *emergentist*. Complexity favours the unpredictable quantum to the deterministic relative. It favours ontogenetic dynamics, the enigmatic inter-ness of the nonspace between ‘things’ - call it flow, movement, process, synapse, affect, individuation, meaning, blind spot, rhythm, interval, phase-shift, bifurcation, rhizome, event-dimension, image¹⁸, fractal, skin, haecceity,¹⁹ intuition, entre-temps. This is the in-between of organisms, nodes, virtual and actual, individual and society - the “stuff” of creative life. The nature and “substance” or lack thereof of that “stuff” has excited the schism between solipsists and positivists, idealists and realists, since the early Greeks. Metaphysical and scientific empiricism have addressed, mystically, pragmatically and pan-culturally, the ethereal intervallic hinge that straddles the inside/outside binary for centuries, each from their own methodological routines.

One bridging concept that resonates between the three sectors of philosophy, science and art is that of *emergence*, in all its shades and hues of *becoming* and transformation. But a true incidence of emergence is neither easily isolated nor generically defined. To complicate matters, *emergence* has a panoply of nearly synonymous processes gleaned from ontologies cited here such as Gilbert Simondon’s transductive process of individuation; Gilles Deleuze and Felix Guattari’s vast glossary of interchangeable neologisms; and the originary concepts of Henri Bergson’s

virtual multiplicities, duration and *élan vital*.²⁰ The ubiquity of emergent processes in contemporary thought needs unpacking to differentiate a clear set of problems and ascertain investigative vectors.

From the origins of Ludwig Bertalanffy's general systems theory (1968) to cybernetics systems to catastrophe, chaos and complexity theory, there have been strict constraints placed on definitions of emergence that jeopardise the commonsense and copious usage of the term in the humanities. Historically, emergentism comes in different types and strengths. *Synchronic* emergence (the irreducible and static arrangement of the properties of systems components) and *diachronic* emergentism (the unpredictability and dynamic novelty of emerging properties) are important tendencies to distinguish. The diachronic/synchronic binarism is implicit in many of the distinctions to follow though this approach will splinter dualities. "Synchronic" refers to a snapshot-like, structural analysis of sameness. "Diachronic" refers to things that change over time, have a history, develop, emerge. If the term synchronic can "capture" structuralism then diachronic comes close to describing the more elusive poststructuralism.

Synchronic emergence is of the homeostatic kind. "[...] a synchronically emergent structure is that which enables focused systematic behaviour through constraining the action of component parts" (Protevi, 2005). It is the recursive, autopoietic conservation of the becoming-new through negative feedback mechanisms; it is 'development', e.g. the organ whose cellular structure is in a continual state of growth and decay, yet maintains its organisational functions in this continuum of change. Its effects are (optimally) predictable. It is reflective, by degree, of early cybernetics systems theory, Bateson's first order through Maturana's second wave (Hayles, 1999). Diachronic emergence on the other hand is the creative production of novel patterns and new thresholds of behaviour in a system and "is what Deleuze will call an 'event', which is not to be confused with a mere switch between already established patterns or with the trigger or 'external event' that pushes the system past a threshold and produces the switch. The Deleuzian event repatterns a system" (Protevi, 2005, 6). It repatterns endogenously, not from an external or transcendental influence that Deleuze calls *hylomorphism*. It leaps and evolves where synchronic emergence (merely) develops. Qualitatively leaps beyond the threshold of catastrophic rupture to mutate, transform, change.

Systemics

The origins of complexity science in differential calculus and non-Euclidean geometry have strong links to twentieth century philosophy. It is through the dynamic concept of emergence in systems that science and the humanities share a common interest in a similar thread. It is a thread that weaves through the structure of biological life, of evolution, of social, political and economic change, of creativity.

Perhaps the most relevant complex systems underscoring this project are biological organisms viewed as autonomous, autopoietic systems and networks of subsystems individuated in the complexity of social systems. Of interest are the dynamic relationships between living beings (the artists) working within a technologically enabled network (multi-maker composition applications and the Internet). This network is further situated within a larger cultural domain. This is the transversality of Deleuze and Guattari; a bio, social, techno intersect.

A network can be hypergenerally described as *a system of interconnected components* much as these systems can be described as networks that change over time. In Eugene Thacker's introduction to Alex Galloway's *Protocol*, he calls a network an abstract concept, often (mis)understood as a metaphor, that signifies "any relationship between two discrete entities". But he adds:

[...] there is also another meaning of "abstract," one that is not the opposite of concrete. *An abstract that is real is a potential.* (Henri Bergson uses the term "virtual" for the immanent unfolding of duration as potentiality.) This is not the abstract use of network as a term, and neither is it an abstraction of a technical term (the metaphorization of technological terms). *Rather, this abstract-but-real is the network that is always enacted and always about to enact itself.* (2003, xiv emphasis added)

The network is abstract-but-real – a virtual individuation of intensive processes, full of potential, the interactions between things and their own morphogenetic processes. But networks are also systems and not all systems are full of potential. Some maintain conditions of possibility and realise those possibilities as discrete, derivative entities. *Possibilities* are not *potentialities*. The former, in Bergson's delineation, are made 'real' after the fact, after they've been actualised. In a sense they are back-propagated and incapable of novelty, known unknowns. They are "retroactively fabricated in the image of what resembles it" (Deleuze & Guattari, 1994, 212). The latter, *potentialities*, may be "actualised" in the morphogenetic, reciprocal con-

tinuity of the virtual/actual; in a dimension of duration. They are the in itself of contingency. Think of possibilities as discretely realised. Think of potentialities as synergetically actualised.

One of the most crucial characteristics of complex systems and networks is self-organisation. There are other terms that are often interchanged with it: autopoiesis, recursivity, self-referentiality, self-generation. Self-organisation is the capacity to spontaneously alter internal structures and adapt to environmental change in a non-hierarchical fashion - bottom-up, decentralised and adaptive. As we shall see in the next chapter, second wave cybernetics is founded on the concept of self-referential “closed” *autopoietic* systems²¹ (Maturana and Varela, 1980, 78). The recursive premise of this theory, though running counter to the posthumanist prioritisation of “open” non-linear dynamics (Hayles, 1999), has impacted theories of embodied cognition and consciousness, particularly through the later research of Francisco Varela. Though Varela contributed to the theory of autopoiesis with Humberto Maturana, he later distanced himself from the second wave though never fully conceding the closed, autopoietic structure of cells. He said of the principle of self-organisation that: “Today people prefer to speak of emergent or global properties, network dynamics, nonlinear networks, complex systems or even synergetics” (Varela et al, 1993, 88). Nuanced debate surrounding *autonomy* and its degrees of closedness in living organisms is reconfigured in concepts of corporeality and relationality; on radical contingency in matter. Debate resurfaces in fresh formulations of terms such as ‘individuation’ and *affect*. Massumi puts this succinctly:

The limits of the field of emergence are in its actual expression. Implicit form may be thought of as the effective presence of the sum total of a thing's interactions minus the thing. It is the thing's relationality autonomized as a dimension of the real. This autonomization of relation is the condition under which higher functions feed back. Emergence [...] is a two-sided coin: one side in the virtual (the autonomy of relation), the other in the actual (functional limitation). Affect is this two-sidedness, the simultaneous participation of the virtual in the actual and the actual in the virtual, as one arises from and returns to the other. (2002a, 35 emphasis added)

Here the field of *emergence* begins to differentiate from the hylomorphic expression of form inscribed on matter. Instead there is implicit form, endogenous form, immanent form that is relationality cum individuation (autonomisation). *Emergence is the expression of the actualised threshold of affect*. Emergence is individuation. The distinction between an essentialist reading of form (hylomorphism) in which

inert matter is inscribed from outside, in a transcendental process, and Gilbert Simondon's individuation, in which form 'emerges' from processes of becoming instantiated by intensity differences, is key to reading the "*effective* presence of the sum total of a thing's interactions *minus the thing*." Implicit form as *in-forma-tion*.

To relational dynamics privileging the event over representation, technology abets a posthuman consistency. Simondon has termed progressive methods such as these *transduction* which:

[...] denotes a process - be it physical, biological, mental or social - in which an activity gradually sets itself in motion, propagating within a given area, through a structuration of the different zones of the area over which it operates. Each region of the structure that is constituted in this way then serves to constitute the next one to such an extent that at the very time this structuration is effected there is a *progressive modification* taking place in tandem with it [...] The transductive process is thus an individuation in progress. (1992, 313 emphasis added)

Thinking in terms of transduction opens a path to theorizing *becoming* through relationality, individuation, intuition and generativity (Mackenzie, 2003, 9). As a tandem method to intuition, it suggests a clear means of negotiating transversal²² intersections of the physical, social, psychological and technological and their emergent properties. As such, "transversality belongs to the processual subject's engendering of an existential territory and self-transportation beyond it" (Genosko, 2002, 55). Progressive iteration, feedback, intuition, transduction, autopoietic recursivity, transversality - all ontogenetic processes of becoming, modulating the rhythmic enfolding/unfolding of the actualising virtual. Transduction, affectively individuated, provides a means of re-thinking technologies as meshed spatiotemporal networks of interacting humans and non-humans. Assemblages, ensembles, meshworks (Deleuze), collectives - all networks of relational contingency.

Rhizomatic KnotWorking

Principles of dynamic networks can be experienced in distributed applications from unmoderated email lists, chats, wiki's and blogs, to Google, eBay and Amazon's variant forms of collaborative filtering. The infrastructure of the Internet is a decentralised network of nodes and the simultaneous nonlinear and linear, hierarchical and decentred, interaction between them. Network theorists, a focal contingent of complexity research, map the Internet with the same equations as "small world"

social networks. Physicist Albert Barabási who mapped the Net in 1999, confirming earlier predictions by social psychologist Stanley Milgram that the human population is separated by six degrees. “Our society, a network of six billion nodes has a separation of six. The Web, with close to six billion nodes, [in 1999] has a separation of nineteen. The Internet, a network of hundreds of thousands of routers, has a separation of ten” (2002, 34). Barabási’s scale-free network models a small world in determining the connectedness of the predominant weak links to the relatively few supernodes, through two principles: growth and preferential attachment (2002, 86). In a small world with any person on earth only six (or fewer) people away from any other person, pervasive communications technologies enable a new translocal dimension. LiveArt extends that contact beyond the ‘virtual’ handshake of telepresence towards a dynamic synergy with emergent potential.

Metcalf’s Law identifies network growth by *squaring* the number of connected nodes. Reed’s Law claims *exponential* growth in networks that provide a means for *groups* to interconnect beyond simple linear transactions.²³ Media theorists have long referred to Deleuze and Guattari’s concept of the *rhizome* to describe the dimensions of the Internet: “Any point of a rhizome can be connected to any other, and must be. This is very different from the tree or root, which plots a point, fixes an order” (Deleuze and Guattari, 1987, 7). “The rhizome is an acentered, nonhierarchical, non-signifying system without a General and without an organizing memory or central automaton, defined solely by the circulation of state” (Ibid, 21). Rhizomatic behaviour grows nonlinear territories by deterritorialising, becoming *abstract machines*²⁴ “covering the entire plane of consistency” (Ibid, 11). A rhizome is also virtual, a unity *and* a multiplicity, made of dimensions and movement, not units. It is of duration, a ‘strange loop’, möbius strip-attractor-fold that is only ever a middle in excess of itself, without beginning or end. It is immanent and self-organising and has no Governor (Galloway, 2003, 34). These definitions of *rhizome* introduce terminologies conducive to creative processes with collaborative technologies: rhizomatic = abstract machine = diagrammatic = e.g. KeyWorx praxis.

Recalling Massumi, the relational autonomy of *emergence* “is the condition under which higher functions feed back.” Those higher cultural functions may as well generate a rhizomatic knotwork. Just as communication techniques enabled through distributed, real time agency can lead to exponential growth of the connected community its proliferation cannot be contrived, commanded or purchased. There is no guarantee for example, that the self-organisational innovation commons of the Internet will continue under the potentially crippling aegis of ever-encroaching proprietary domains, copyright and patent strangleholds, corporate globalisation, gov-

ernmental usurpation and privacy derailments. These developments could effectively dead-end the future of proliferating communities. Is this inevitable entropy or an order-to-chaos-to-order recursion? Emergence is as emergence does. As the old Net mutates, a new Net will doubtless evolve. Whatever the utopian/dystopian prospects, co-operative methods, above and underground, will be the backbone of new work by artists recombinantly organising network protocols and structures. Networks becoming-other; becoming knotworks, becoming meshworks. Collective contingency is irreducible to its technicity.

This is not merely to say that technologies can have different meanings, different uses or different effects within any given social context. Rather, this margin of contingency or indeterminacy participates in the constitution of collectives [...] originary technicity²⁵ does help remind us that *the problem of thinking about technology is also a problem of thinking about time, corporeality and, indeed, thinking about thinking*. (Mackenzie, 2002, 3 emphasis added)

The role of technology in processes of collective individuation is as fundamental as it is confounding. It acts upon collectives as it is acted upon; it is a constitutive element. Technology is the in-itself of the human temporal continuum, incorporeal materialism and modes of thought. These ontologies are inextricable from conceptualising networks and their emergent potentials. They are contributing dimensions in complex structures.

Ontology and Event Potential

The term *ontology*, in its philosophical bias, concerns the nature of existence, of Being, of “what is-ness”. It also carries a taxonomical flavour reflecting the categorisation of things and their relations.²⁶ It has been co-opted by computer science to refer to underlying strategies of classification in platforms and applications. Ontologies, in this context, are collections (domains) of objects, concepts and events in relational, continuous flux; ensemble systems. Deleuze and Guattari have insisted on a “positive ontology”, one that rejects descriptions of “things” as what they are NOT, by what they might lack. In this sense, the decentralised, non-hierarchical nature of self-organised complex systems could indeed be thought of as ontologies. Elizabeth Grosz has stated her preference for ontological approaches over epistemological approaches by pointing out that “Ontology is primary. Ontology always has both an ethical and a political dimension. It’s not as if there is ontology and ethics, ontology and politics. *Ontology is about what there is and what debts we owe*

to it. It always entails an ethics, a debt, obligation, responsibility”(emphasis added) (Ausch et al, “Interview with Elizabeth Grosz”). This is certainly an important observation for framing ontologies that incorporate social interplay. However, *ontogenesis*, a way of considering dynamic movement within or between domains, will surface as the more useful concept when our focus is on action. It is what-is-ness in continuous, ungraspable change. It is akin to Bergson’s duration in that it always differs from itself; is self-varying; what-is-ness that does not ‘stop’ to become a discrete, positioned “what is”. Ontogenesis is *potential*:

A potential does not pre-exist its emergence. If it doesn’t emerge its because it wasn’t really there. If it does it really only just arrived. Potential is an advent. It is the contingency of an event in the future imperfect: ‘will have’ (precessive processing). It just will have come, that’s all there is to it. (Massumi, 2002a, 226)

In this reading, potential is an event’s contingency, its indeterminacy. How, then, might the pure *event*, an event beyond experience, be described? Massumi again:

[...] As time-form it belongs to the virtual, defined as that which is maximally abstract yet real, whose reality is that of potential - pure relationality, the interval of change, the in-itself of transformation [...] It is non-linear, moving in two directions at once: out from the actual (as past) into the actual (as future). The actuality it leaves as past is the same actuality to which it no sooner comes as future: from being to becoming. (Ibid, 58)

The event is the pure relationality of future-past. It might be liberally construed as a singularity, a potentiality. The event might be a topological form that is difference-in itself (Deleuze and Guattari); a *metastability*, something that is not fully in phase or coincident with itself (Simondon); a “far from equilibrium” occurrence (Prigogine). Deleuze and Guattari situate the unity of the individuated aggregate as a *haecceity* that is “the wolf, itself, and the horse, and the child, that cease to be subjects to become events” (1987, 262). In any given network of relations there are individuating events within a structure whose organisation is one of event potential. Events supplant representations. They precipitate diachronic emergence in complex systems. But from what set of dynamic conditions do events occur and how might they trigger emergent behaviours?

The Complexity Factor and Relationality

The prerequisites of legitimate complex systems and their properties are notoriously difficult to define and are often subject to debate and factionalized description. A straightforward definition of complexity from Paul Cilliers:

The interaction among constituents of a system, and the interaction between the system and its environment, are of such a nature that the system as a whole cannot be fully understood simply by analysing its components. Moreover these relationships are not fixed, but shift and change, often as a result of self-organisation. This can result in novel features, usually referred to as emergent properties. (1998, ix)

A more rigorous definition from John Protevi in his essay "Deleuze, Guattari and Emergence" describes the elements of complexity and its theory:

[...] complexity theory models material systems using the techniques of nonlinear dynamics, which, by means of showing the topological features of manifolds (the distribution of 'singularities') affecting a series of trajectories in a phase space, reveals the patterns (shown by 'attractors' in the models), thresholds ('bifurcators' in the models), and the necessary intensity of triggers (events that move systems to a threshold activating a pattern) of these systems. By showing the spontaneous appearance of indicators of patterns and thresholds in the models of the behaviour of complex systems, complexity theory enables us to think material systems in terms of their powers of immanent self-organisation. (2005, 1-2)

Within complex systems then, events trigger thresholds which in turn activate patterns. These global patterns of organisation are often not retraceable to their particular parts (Buchanan, 2002). This gives complexity theory a holistic or absolute flavour that is disputed by reductionist practitioners as an implausible due to its very complexity. Of interest though, is the discernable shift in interdisciplinary research towards a furthered understanding of the relations between systems and subsystems and their environments This shift foregoes a preoccupation with isolated component functionality. Rejecting a transcendental teleology, non-hierarchical self-organisation is an important, indeed defining, process in complex systems theory.

Protevi succinctly isolates three bottom-up, connected concepts that articulate the basics of complex models; 1) the range of behaviours of the system being modelled, 2) elements in the dynamic, phase space model such as bifurcations, attractors and their trajectories, 3) the mathematics used to describe the system such as manifolds, functions and singularities (2005, 3). Although there is limited consensus on the basic constituent *properties* of complex systems, the classification of these six quantifiable properties distinguishes the truly complex from the merely complicated. These distinctions allow for potential emergent behaviour:

- Elements (and their number)
- Interactions (and their strength)
- Formation/Operation (and their time scales)
- Diversity/Variability
- Environment (and its demands)
- Activity(ies) (and its[their] objective[s]) (Bar-Yam, 1997, 5)

Characteristics of complex systems would include spatial structure, the Time of dynamic processes, self-organisation and degree of complexity. Of these properties and characteristics, additional factors contributing to *possibility*²⁷ in *open systems* would include feedback (positive and negative), degrees of control and cooperation, patterns and randomness. Under certain conditions, these accumulated properties can arrive at a balance point, often referred to as the “edge of chaos”, a constantly shifting point between order and disorder or “the one place where a complex system can be “spontaneous, adaptive and alive” (Waldrup, 1992, 12). This also may be referred to as “effective complexity”. Highlighting a single qualification of a system, the characteristic of “degrees of complexity” for example, gives interesting insights when coupled with a philosophical logic. A description from physicist Murray Gell-Mann, Nobel prize winner and pioneer of complexity research, on the set of an entities regularities states:

[...] something almost entirely random, with practically no regularities, would have effective complexity near zero. So would something completely regular, such as a bit string consisting entirely of zeroes. *Effective complexity can be high only in a region intermediate between total order and complete disorder.* (Gell-Mann, 1995, emphasis added)

Effective complexity refers to the emergent potential of decentralised, self-organising systems and is itself a “middle” state or assemblage of elements in various degrees of regularity; an “in-between”. But is this effective in-between a hybrid

state? Are the elements of regularity and irregularity spatially positioned in a medial blend or does it have a unique ontological status that folds into a virtuality - a temporal field of potential? Effective complexity *is* change. To understand effective complexity only as determined by its median positioning on a regularity spectrum is to underestimate it as a concept. Is there another way to understand the event of complex potential? The task is to construe effective complexity not as a negation of the determinate, the logically indeterminate, but as intensive potential. Effective complexity is intensive potential conditioned by the extreme states of high or low regularity. Does it require its own ontological status?

What would it mean to give logical consistency to the in-between? It would mean realigning with a logic of relation. For the in-between as such is not a middling being but rather the being *of* the middle – *the being of a relation*. A positioned being, central, middling or marginal, is a term of relation [...] *The terms of relation are normally assumed to precede their interrelating, to be already-constituted. This begs the question of change, because everything is given in advance.* (Massumi, 2002a, 70, emphasis added)

Here, Massumi positions “identity” on a cultural grid, along with the problems associated with hybrid theories of border cultures. He highlights a form of performance that can’t quite achieve “true” change (the point of this diversion) due to its dependence on the extreme “foundationalisms” that provide a sense of an “in-between” positioning in the first place. Massumi suggests that the generative, *a priori* mapping of terms only back-projects a given constitution and the notion of “change” is swallowed up in the spatialised array. Granted, this social mapping context is a seemingly unequivocal analogy to the quantitative balance of regularities that define effective complexity (change itself). But is it? Insistence on the autonomy of the relation to its terms and an engagement with the in-itself of change, the “being *of* relation” is at stake. *Becoming* then, is an unmediated in-between of order and chaos; a chaosmos (Guattari, 1995), a compositional chaoid (Deleuze and Guattari, 1994). In Gell-Mann’s conditions of degrees of complexity, order and chaos are the correlative foundationalisms. More abstract perhaps than “individual” and “society”, the terms of Massumi’s context, but not unrelated. Effective complexity, the in-between relation of order and chaos, is a constantly shifting autonomy; its relation to its foundational terms is never static. This line of theoretical discourse hits the concept of emergent change squarely in its elusive in-betweenness. It begs the questions: Is emergence the becoming of being that bursts from a relational interval as an autonomous ontology? Does emergence emerge from relation? Is emergence simply the becoming-being of relation? Any relation?

These questions can be addressed through Bergson's methodology of Intuition, which emphasises the status of relations in their own right through processes of division. Intuition recognises the relations of its terms and their tendencies. Simondon's system of *individuation* also addresses these questions:²⁸

[...] it would be possible *to consider every genuine relation as having the status of a being, and as undergoing development within a new individuation*. A relation does not spring up between two terms that are already separate individuals, rather it is the aspect of an *internal resonance of a system of individuation*. It forms part of a wider system. (Simondon, 1992, 306)

The autonomous, individuating relation is a resonator. The unpositionable, phase-shifting movement of the being of the in-between. The emergent event.

Bifurcations, catastrophes and differentiations

Deleuze's thinking, like Bergson before him, was co-extensive with the developing science of his time. It is widely assumed that one of Bergson's prevailing influences was the mathematician G.B.R. Riemann's work on multiplicities. Deleuze's thinking expounds on Bergson's adaptation of multiplicities in step with the catastrophe theory, chaos theory, dissipative systems theory, and quantum theory of his era. The integration of scientific, philosophic and artistic methodologies, much discussed in contemporary interdisciplinary practice, is a complex concept. For Bergson, hybrid scientific/philosophical methodologies were not viable. He advocated tandem explorations, the two "halves" of the Absolute "to which science and metaphysics correspond" (Deleuze, 1991, 116) as a way to conceive the relations of parallel domains. The distinctive creative processes of these disciplines remain irreconcilable differences-in-kind, commonly manifesting in lived experience. Bergson: Science is abstract, philosophy is concrete. Deleuze and Guattari: Science thinks the function, philosophy the concept. Bergson's Intuition is a method of division. It differentiates tendencies, forces. Division bifurcates. *Bifurcations* are integral to contingency and difference in systems logic. They will be explored before addressing difference and an intuition in detail in Chapter Three.

Ilya Prigogine, the Belgian physicist awarded the Nobel Prize for his work on dissipative structures and far-from-equilibrium dynamics and his colleague Isabelle Stengers, have a simple definition for bifurcation: "The branching of a solution into

multiple solutions as a system is varied” (1996, 201). This bifurcating principle is also known as *contingency*. Bifurcations mark a point or an event at which a system divides into two alternative behaviours. Each trajectory is possible. The line of flight actually followed is often indeterminate. This is the site of a contingency, were it a positionable “thing.” It is at once a unity, a dualism and a multiplicity:

Bifurcations are the manifestation of an intrinsic differentiation between parts of the system itself and the system and its environment. [...] The temporal description of such systems involves both deterministic processes (between bifurcations) and probabilistic processes (in the choice of branches). There is also a historical dimension involved [...] Once we have dissipative structures we can speak of self-organisation. (Ibid, 69-70).

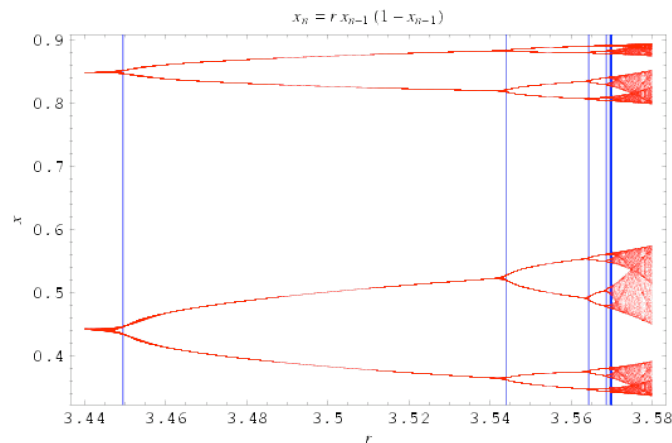


Figure 1.1 Image and description of bifurcations from Stephen Wolfram’s Mathworld website: “In a dynamical system, a bifurcation is a period doubling, quadrupling, etc., that accompanies the onset of chaos. It represents the sudden appearance of a qualitatively different solution for a nonlinear system as some parameter is varied. The illustration above shows bifurcations (occurring at the location of the blue lines) of the logistic map as the parameter r is varied. Bifurcations come in four basic varieties: flip bifurcation, fold bifurcation, pitchfork bifurcation, and transcritical bifurcation (Rasband 1990).²⁹”

A bifurcation, according to Prigogine and Stengers, exhibits determinacy and choice. It pertains to critical points, to singular intensities and their division into multiplicities. The scientific term, *bifurcation*, can be substituted for *differentiation* when exploring processes of thought or as Massumi explains *affect*:

Affect and intensity [...] is akin to what is called a critical point, or *bifurcation* point, or singular point, in chaos theory and the theory of dissipative structures. This is the turning point at which a physical system paradoxically embodies multiple and normally mutually exclusive potentials... (Massumi, 2002a, 32)

The endless bifurcating division of progressive iterations, the making of multiplicities by continually differentiating binaries, by multiplying divisions of dualities - this is the ontological method of Bergson and Deleuze after him. Bifurcations diagram multiplicities, from monisms to dualisms, from differentiation to differentiation³⁰, creatively progressing. Manuel Delanda offers this account, which describes the additional technicality of control parameters, analogous to higher-level computer technologies that enable dynamic interaction. These protocols and variable control parameters are later discussed in detail in terms of media objects in the metaphorical state space of an in situ technology:

[...] for the purpose of defining an entity to replace essences, the aspect of state space that mattered was its singularities. One singularity (or set of singularities) may undergo a symmetry-breaking transition and be converted into another one. These transitions are called *bifurcations* and may be studied by adding to a particular state space one or more 'control knobs' (technically control parameters) which determine the strength of external shocks or perturbations to which the system being modeled may be subject. (2002, 19)

This definition is especially relevant to technicities (the transductive dimension of technical objects: Mackenzie, 2003, 16) within cultural domains in which control parameters are accessible to multi-maker modulation. Here, to be specific for purposes of this thesis, I refer to artist technologies in which the parameters of media objects and the intensity of their relations to other objects/subjects (participating players) are dynamically modified.³¹ Bifurcations, when they produce a discontinuous jump or leap in the otherwise continuous stability of a nonlinear, dynamic system, have been mathematically formulated as *catastrophes* in French mathematician Rene Thom's theory. They are extreme, discontinuous bifurcations; seismic shifts. The topological folds of Catastrophe Theory are metaphorically pertinent to the input/out, black box technicity so redolent in media technologies³².

Another useful example of bifurcation with respect to research in the neurological and cognitive sciences is Francesco Varela's theory of the emergence of microidentities and microworlds. The ready-for-action neuronal clusters that produce mi-

croidentities,³³ from moment to moment, are what he calls bifurcating “break-downs”. These critical events in which a path or microidentity is chosen are, by implication, creative:

On the basis of this fast dynamic, as in an evolutionary process, one neuronal ensemble (one cognitive subnetwork) finally becomes more prevalent and *becomes the behavioral mode for the next cognitive moment*. By “becomes more prevalent” I do not mean to say that this is a process of optimization: it resembles more a *bifurcation* or symmetry-breaking form of chaotic dynamics. (1992a, 334 emphasis added)

Varela’s “breakdown” is an event triggering diachronic emergence – a timeless interval of reserve potential that “restructures the virtual” (Protevi, 2005). Varela, with his deeply phenomenological leanings, and Deleuze and Guattari, with their nomadic surfaces, share a jagged cartography of concurrence. Their leanings vacillate (resonate) between difference and resemblance.

Feedback and Contingency

One of the fundamental characteristics of complex systems is feedback. In the early days of the new science of cybernetics, around the time of the Macy conferences that Katherine Hayles unpacks in *How We Became Posthuman* (1999), Gregory Bateson’s description of systems was part of what is now called first order or first wave cybernetics. It bears re-mentioning. How one chooses to understand recursion colours creativity, the imagining of the “new.” Cary Wolfe (1998) notes that in Bateson’s view, any system (social, biological, mechanical) self-organises in order to achieve and maintain homeostasis and harmony. These systems adhere to four principles, paraphrased here as: 1) they operate upon differences; 2) they consist of closed loops along which differences and their transformations are transmitted; 3) events in the system are energised from the respondent and not the triggering mechanism; 4) systems self-correct in the direction of homeostasis and/or “run-away” (positive and negative feedback respectively) (Bateson, 1972, 482 In: Wolfe, 1998, 55). The recursive causality of the feedback loop is fundamental to both first and second order cybernetics and plays a prominent role in the virtuality of third order systems thinking.

A familiar example of negative feedback is the way in which a thermometer maintains a stable temperature. Feedback in this case is a process of measurement that causes actions to be taken (firing of a heater), which in turn effect the thing being

measured (temperature). There is a loop that maintains homeostasis given the variable set point or value of the system (e.g. 70 degrees Fahrenheit/21 degrees Celsius). Negative feedback affects the freedom of a system to change or transform given its constraints and limits (which are sometimes variable). It stabilises. Negative feedback is a controlling mechanism.

If negative feedback is associated with homeostasis then it figures that positive feedback, characterised by Bateson as “runaway,” is chaotic. Positive feedback is destabilising; change is amplified and exaggerated, it spins out-of-control. A system responds to positive feedback by variable changes in the same direction. Think of a Hendrix guitar solo as artistic manipulation of fast-forwarding feedback. Positive feedback can also be characterised by terms such as “vicious cycle” and “network effect”.³⁴ Some form of positive feedback is needed in a system to generate innovation, novelty, something new. An effective mix of negative and positive feedback is recursive, (alternatively labeled “autopoiesis” in the domain of living systems) and has a range of appropriate definitions:

Feedback and feed-forward, or recursivity, *in addition to converting distance into intensity, folds the dimensions of time into each other*. The field of emergence of experience has to be thought of as a space-time continuum, as an ontogenetic dimension prior to the separating out of space and time. *Linear time, like position gridded space would be emergent qualities of the event of the world's self-relating*. (Massumi, 2002a, 16 emphasis added)

[recursivity] uses the results of its own operations as the basis for further operations - that is, what is undertaken is determined in part by what has occurred in earlier operations. In the language of systems theory [...] one often says that such a process uses its own outputs as inputs. (Luhmann, 1990, 72 In: Wolfe, 1998, 56)

A person reaches for a glass of water and as she extends her arm and hand is continuously informed (negative feedback) - by visual or proprioceptive sensations - how close the hand is to the glass - and then guides the action accordingly so as to achieve the goal of smoothly grabbing the glass. (Heims, 1993, 15 In: Ibid, 55)

As Wolfe points out, there is an ultimate paradox to recursivity, which generated the move from Bateson's first order cybernetics (a determinate, totalizing pattern connecting observer and observed) to the second order autopoietic cybernetics of

Maturana, Varela, von Foerster and Luhmann. In a recursive loop, A causes B *and* B causes A. This paradox plus “the contingency to all observation to which such paradoxicality attests (we can say *either* A causes B *or* B causes A; thus it is always possible to observe otherwise” (Wolfe, 1998, 56). What’s remarkable about this, is that it sets the stage for recursivity to be imbued with a new meaning that alters its form from a circular loop to what Varela has called a “strange loop” which can analogically be described by a möbius strip, a two-dimensional figure with one side; an object with no extremes, only a continuous middle. This describes the “paradoxicality of distinction” which must always accompany the assertion of contingency that an observation could always be otherwise. (Ibid, 56-7).

The mathematics of self-reference involves creating formalisms to reflect the strange situation in which something produces A, which produces B, which produces A. That was 1974. Today, many colleagues call such ideas part of complexity theory. (Varela, 1995)

This is another way of thinking the autonomy of the relational middle through the dissolution of the terms ‘inside’ and ‘outside’³⁵ but further begs the question of a *being of the middle* in the absence of external terms.

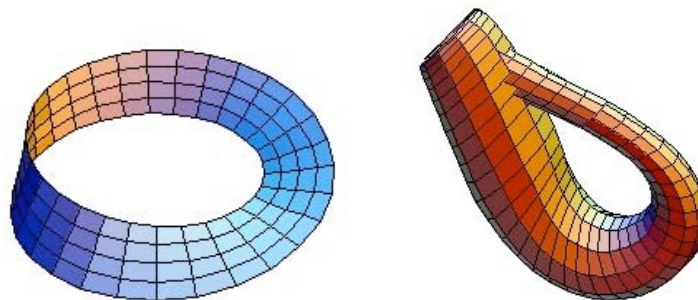


Figure 1.2 Images of two-dimensional Euclidean topologies: a Möbius strip and a Klein bottle from Stephen Wolfram’s *Mathworld*.³⁶

So, the circularity of Bateson’s feedback loop transformed, through a necessity to include observer contingency (previously asserted in physics by Einstein and Heisenberg), to the “strange” (fractal, chaotic) loop of Varela.

To imagine feedback in a generic complex system model, a fictive, multidimensional phase space, something Deleuze and Guattari might refer to as a *plane of consistency*³⁷ would be described. Every phase space describes its system by the number of 'degrees of freedom' or dimensions that system models e.g a pendulum has two degrees of freedom; a bicycle, ten (Delanda, 2002,13-14). *Attractors* occupy phase space. *Singularities* determine where attractors can be found in that phase space. "A singularity in the manifold indicates a bifurcator in the phase space model which in turn represents a threshold where the real system changes qualitatively." (Protevi, 2005, 5). There are three types of attractors; *point* (stable), *loop* (oscillating) and *strange* or fractal (chaotic) and they form, within the phase space of the model, "basins of attraction". Their positions in phase space describe the patterns and behaviours of the system. Most basins remain stable (homeostatic) through negative feedback but some have "thicker" bifurcators that tend to make the basins more sensitive to the slightest movement and MAY (element of chance, potential catastrophe) trigger a move to another basin of attraction, causing a new pattern to emerge. It's here that the tie between bifurcating processes and recursive processes meet, in the 'event potential' of creativity. This is ontogenesis *and* autopoiesis. Extrapolating through a logic of ontogenetic indeterminacy what the recursive combination of both types of feedback further stimulates:

If feedback from the dimension of the emerged reconditions the conditions of emergence, then conditions of emergence change. Emergence emerges. Changing changes. (Massumi, 2002a, 10)

Nonlinear causality, a hinge between simple determinism and simple indeterminism, underlies the concept of feedback loops as descriptive of emergent novelty. Deleuze and Guattari call this hinge "reverse causality or advanced determinism" (Deleuze and Guattari, 1987, 336). The *quasi cause*, more pertinently, affects and is affected by any formulation of chance, indeterminacy and out-of-control critical to composition, particularly multi-maker, real time composition. The quasi cause, unlike linear stimulus-response causality, is sensitive-affective; is situational rather than contextual (Massumi, 2002a, 225). To grasp the ramifications of complexity theory tenets with respect to feedback, self-organisation and bifurcation as differentiation, it is appropriate to take an historical step backwards to address the history of *multiplicity* and how it coincides with progressive developments in science and the humanities.

Science, Philosophy and Bergson's Multiplicities

In the early decades of the twentieth century, the thought of Henri Bergson (1859-1941) dominated the continental philosophical scene and percolated in the salons of intellectual Paris, influencing artists, philosophers and scientists alike. He was a contemporary of fellow process/pragmatist philosophers Alfred North Whitehead in England and William James in the United States. Their influences were reciprocal. They all shared an affinity for the temporal, for complex continuity that is both multiplicity and unity; for plurality. Though Bergson's thought is often characterised as unrelentingly metaphysical, it sports a material, empirical method that has led to recent re-evaluations and comparisons between the pragmatist agenda of contingency, historicity and difference (Wolfe, 1998)³⁸. This variation of radical empiricism - "the felt reality of relation" (Massumi, 2002a, 16) has been embraced by Bergson's "poststructuralist"³⁹ and posthumanist progeny. Deleuze has claimed that the aim of philosophy "to analyse the" state of things" - which "are neither unities nor totalities but *multiplicities*" - "in such a way that non-preexistent concepts can be extracted from them" (1987, in: Wolfe, 1998, 101).

Bergson's popularity, in Europe and abroad, began to wane after the Second World War. A new generation of French philosophers became enamored with the burgeoning phenomenological movement of their German counterparts, primarily Edmund Husserl,⁴⁰ Martin Heidegger and Ludwig Wittgenstein. One premise phenomenology offered, that Bergson dismissed, was the treatment of language as a science with an ontological status. He entertained a longstanding suspicion of language as symbols that divide and spatialise the continuity of duration. He rejected, as did Deleuze and Guattari, dialectical practice as a method of negation, a negative ontology; an ontology of what is NOT. They sought a positive ontology. Bergson's turn towards Intuition as a philosophical method replaces the negation implicit in dialectical analysis. For Bergson, the dialectical division of continuity is one "of exteriority, of simultaneity, of juxtaposition, of order, of quantitative differentiation, *of difference in degree*: it is a numerical multiplicity" (Deleuze, 1991, 38). As an *actual* multiplicity of space, it is the digital. Bergson distinguished another important multiplicity in "la durée"; non-metrical time that "is an internal multiplicity of succession, of fusion, of organisation, of heterogeneity, of qualitative discrimination, or of *difference in kind*" (Deleuze, 1991, 38). This is authentic difference as opposed to *difference in degree*. Duration is a continuous and virtual multiplicity. It exhibits a primacy over the static, numerical, homogenous positioning of the spatial. It is analogue. It is continuous. Passage precedes position (Massumi, 2002a, 46).⁴¹

G.B.R Riemann, a 19th century mathematician and physicist, developed a theory of multiplicities that was to influence scholars and scientists. Einstein's theory of Gen-

General Relativity leans heavily on Riemann's research. From Riemann's work on topological surfaces,⁴² Bergson ran with the concept of multiplicities. The concretising of these mathematical abstractions by philosophers and social scientists has played a fundamental role in 20th century thought. In *Bergsonism*, Deleuze explains Riemann's multiplicities as:

[...] those things that could be determined by their dimensions and their independent variables. He distinguished *discrete multiplicities* and *continuous multiplicities*. The former contain the principle of their own metrics (the measure of one of their parts being given by the number of elements they contain). The latter found a metrical principle in something else, even if only in phenomena unfolding in them or in the forces acting in them. (1991, 39)

Bergson's idea of multiplicities is one of his classic monistic dualisms (the first iteration of a bifurcation). Bergson divides time from space to exact two fundamental multiplicities. A qualitative multiplicity is described as the "immediate data of consciousness," which is heterogeneous, continuous, indivisible (non-numerical), intensive and virtual. The other, a quantitative multiplicity is homogenous, spatial, discrete, metrical, extensive and "real".⁴³ Qualitative multiplicities cannot be represented by symbols and can only be experienced through intuition. Alternatively, quantitative multiplicities are experienced through intellect, but it is the mix or composite of these multiplicities that is unified, lived experience. Delanda applies chaos theory to Riemann's nineteenth century science:

A multiplicity is a nested set of vector fields related to each other by symmetry-breaking bifurcations, together with the distributions of attractors, which define each of its embedded levels. (2002, 32)

Scientific and philosophical concepts have profoundly intertwined stakes but are often seen as incompatible rather than co-extensive⁴⁴ Bergson adapted Riemann's concept of multiplicities, as did the young Einstein, though their interpretations had radically different results. In 1922, Bergson called upon Einstein to debate his then popular Theory of General Relativity. It is widely accepted that Bergson handily lost his argument that Relativity should be reinterpreted as time-centred instead of space-centred, substantiating his own claim to the non-linear, irreversible nature of duration and breaking with the long established Newtonian premise that space holds a primacy over time. What substantively separated the men is Einstein's ideological determinism and Bergson's belief in contingent indeterminacy. Einstein's

quest for a unified, continuous deterministic theory of the universe is now complemented by a resolutely probabilistic quantum theory in which the simultaneous measurement of the movement and position of a particle is uncertain. This wave/particle duality resembles Bergson's temporal/spatial multiplicities. The Einstein/Bergson debate in many ways prefigures the divide in contemporary physics between the deterministic Relative and the indeterminate, relational Quantum; between a reversible Time (Einstein) and irreversible Time (Bergson); between configurations of the possible/real and the virtual/actual. It is believed that Bergson sought not to refute Einstein but complement Einstein's theory with an empirical metaphysics that could think Time in pure relation. Although Bergson lost the debate with Einstein in 1922, his inclinations, resurfacing in process physics⁴⁵ and quantum mechanics, were also acknowledged by Prigogine and Stengers who frame scientific inquiry as incomplete and "practical", concurring with Bergson's assessment (1984).⁴⁶ Prigogine however, reflected before his death, that science was now capable of understanding "Time" and that metaphysics had a diminished role to play.⁴⁷ The Relativity debate incited by Bergson was based on his view that science either ignores or is inherently unable to explore heterogeneous continuities such as Time (for Einstein Time is homogeneous). Ironically, with new science's pull towards complexity and the quantum, this schism is blurring. Scientists such as Benjamin Libet, who famously exposed the half-second readiness-potential (Chapter Four) in conscious perception, admits that:

[...] the nonphysical nature of subjective awareness, including the feelings of spirituality, creativity, conscious will, and imagination, is not describable or explainable directly by the physical evidence alone [...] many scientists and philosophers appear not to realize that their rigid view that determinism is valid is still based on faith. ⁴⁸ (Libet, 2004, 5)

The growing pains of interdisciplinary practice between the sciences and the arts are frequently tested. Collaborative practice between philosophy and science is still awkward at best, but it can be argued that pervasive technologies are blurring divisional boundaries. Deleuze and Guattari discuss what they see as the three-plane relationship between philosophy, science and art in their last book, *What Is Philosophy?* The separate domains they determine to be irreducible are integral to collaborative, transdisciplinary practice and can be seen to be particularly relevant to an analysis of mediated performance art (LiveArt), for which this chapter lays down the broad strokes of a larger context. Ultimately, their distinctions may be challenged when framed in the technicity of current interdisciplinary, real time compositional practice. That challenge ruptures a profound distinction in differentiating

modes of creative thought and must be carefully argued via Deleuze and Guattari's own exception to the rule – *interference* – the impinging of a discrete creative process on another (1994, 216-17).

Chapter Two

The HUH? Factor: Humans-Understanding-Humans

[...] the provisional definition of subjectivity I would like to propose as the most encompassing would be: "The ensemble of conditions which render possible the emergence of individual and/or collective instances as self-referential existential Territories, adjacent, or in delimiting relation, to an alterity that is itself subjective [...]. The term "collective" should be understood in the sense of a multiplicity that deploys itself as much beyond the individual, on the side of the socius, as before the person, on the side of preverbal intensities, indicating a logic of affects rather than a logic of delimited sets. (Guattari, 1995, 9)

The Question of Subjective Closure

The split between phenomenology and *poststructural nomadic thought*, concerns the concept of multiplicity, reworked from Riemann's original postulates. Multiplicities have a unique and specific purpose in contemporary theory. They provide a means of negotiating the thorny issue of "essences" – both material and processual. "Multiplicities specify the structure of spaces of possibilities, spaces which, in turn, explain the regularities exhibited by morphogenetic processes (Delanda, 2002, 10). For phenomenologists (and this is certainly a broad generalization) *being* precedes *becoming*; there is a unified consciousness of the subject that is always considered in relation to a multiplicity of phenomena. Deleuze simplifies the distinction: "[...] all consciousness is consciousness *of* something (Husserl), or more strongly, all consciousness *is* something (Bergson)" (1986, 58). To delve into the nature of experience, there must first be an experiencing subject that conserves an identity, a certain sameness or unity over time; a developing, enacting subject relative to an evolving world. In contrast, process thinkers, generally, are inclined towards the production of subjectivity as difference, as relation. Simondon's version of individuation is indicative:

We must begin with individuation, with the being grasped at its centre and in relation to its spatiality and its becoming, and not by a realized [*substantialisé*] *individual* faced with a *world* that is external to it [...] a being does not possess a unity in its identity, which is that of the stable state within which no transformation is possible; rather, a being has a *transductive unity*, that is, it can pass out of phase with itself, it can – in any area – break its own bounds in relation to its *centre*. What one assumes to be a *relation* or a *duality of principles* is in fact the unfolding of the being, which is more than a unity and more than an identity; becoming a dimension of the being,

not something that happens to it following a succession of events that affect a being already and originally given and substantial. (1992, 310-11)

In Bergson's first book, *Time and Free Will: The Immediate Data of Consciousness*, passage precedes position and consequently, the reality of something isn't necessarily preceded by its possibility; possibility is back-formed from its realisation. This is a fundamental and important distinction. This issue represents an elementary difference between phenomenologically-oriented system theory advocates including second order cyberneticists (Humberto Maturana, Francisco Varela, Niklas Luhmann), a host of contemporary theorists, scientists and artists from presence researchers, cultural theorists, HCI (human-computer-interaction) and HCHI (human-computer-human-interaction) designers (Dourish, 2003) from their poststructuralist counterparts. The dubious role of subject/object, idealist/realist relativism is brought forward here in emphasizing an ontological premise, rather than an epistemological premise, for mediated performance. Specifically, focusing on technologically enabled performance that is situatedly translocal and interauthored in real time (*la durée*). Both factions are virulently anti-representationalist. From a neurophenomenological corner (a discipline that neatly bridges science and philosophy), Varela and colleagues have charted a compromise movement, a middle way. They have stated that their aim is to:

[...] negotiate a middle path between *the Scylla of cognition as the recovery of a pre-given inner world (realism)* and *the Charybdis of cognition as the projection of a pre-given inner world (idealism)* [...] These two extremes both take representation as their central notion: in the first case representation is used to recover what is outer and in the second case it is used to project what is inner. Our intention is to bypass entirely this logical geography of inner versus outer by studying cognition not as recovery or projection but as *embodied action*. (Varela et al, 1993, 172 emphasis added)

In *The Embodied Mind* (Varela, Thompson, Rosch, 1993), Varela describes a process of self-organisation through which localised cognitive processes, including neural triggering, sensation, the autonomic machinations of the internal organs, emerge to a global state. But they don't label this state "being". Rather, they regard this global state as a fictive yet functional "non-being" that constrains, through autopoiesis (a self-referential form of negative feedback), a means of acting in the world as a unified, autonomous entity. These explanations, which emanate from the phenomenological branch of the cognitive and social sciences, are in many respects sympa-

thetic with the Bergson/Deleuzian actualisations of processes of becoming. Delanda explains:

There are at least two lines of argument used by Deleuze to defend the idea that the future is not given in the past. The first one is directly related to his theory of *individuation or actualization* [...] that is, a theory of intensive processes of becoming involving spontaneous spatiotemporal dynamisms, or as I refer to them, processes of self-organization. The simplest self-organizing processes seem to be those involving "endogenously-generated stable states", such as states of minimal energy acting as "attractors" for a process. (1998)

In this view, ontogenesis (individuation) is autopoiesis (from the Greek for self-organizing or self-making). Ontogenesis and autopoiesis are isomorphic processes. Delanda gives topological examples of morphogenesis in matter such as the formation of soap bubbles, which are points in space consisting of energetic possibilities for changing the shape of their assemblage. He states that even a topological form as a minimal point can "guide the processes that generate other geometrical forms." One might draw an analogy here to Varela's non-being in which the parts self-organise to form and continuously shape the global.

For example, these spaces may contain closed loops (technically called "limit cycles" or "periodic attractors"). In this case the several possible physical instantiations of this space will all display isomorphic behavior: an endogenously generated tendency to oscillate in a stable way [...] Deleuze calls this ability of topological forms to give rise to many different physical instantiations, a process of "divergent actualization", taking the idea from French philosopher Henri Bergson who, at the turn of the century, wrote a series of texts where he criticized the inability of the science of his time to think the new, the truly novel. (Ibid)

This divergent actualisation is later developed by Deleuze and Guattari as *transversality*, a concept that relies on a variant of Varela's autopoietic recursion. Protevi and Hansen cite the convergences and divergences of the Varelian and Deleuze and Guattarian positions on the autopoietic organism.

Briefly put, DG will completely agree with the autopoietic notion of the organism as an instance of synchronic emergence dedicated to homeostatic stability, but they want also to think the relation of the (actual) organism to

life, which for them is a virtual multiplicity which is actualized in differentiating bursts of diachronic emergence – a notion which it turns out is quite close to the ‘natural drift’ argument of the later Varela [...] DG’s reading matches the autopoietic conception of the organism. *Autopoietic theory distinguishes between the (virtual) organisation and the (actual) structure of organisms. Organisation is the set of all possible relationships of the autopoietic processes of an organism; it is hence equivalent to a virtual field or the Body without Organs of that organism.* (Protevi, 2005, 16-17 emphasis added)

Protevi’s interpretation of autopoietic organisation as equivalent to the virtual, unformed, unorganised BwO is in many ways radical. Many theorists distinguish the theory of autopoiesis as ‘closed’ system theory in contrast to virtuality which signals the third wave cybernetics of open systems (Hayles, 1999). One’s position on this issue, though distinctions are indeed ‘fuzzy’, dictate, the descriptives of discourse. The preference here favours the catalysis of human-machinic interplay as it veers towards the transductive and transversal. But these terms of fluidity should remain fluid. Despite a nearly universal theoretical disavowal of the Cartesian paradigm, is it still problematic to surrender the Enlightenment’s legacy of the liberal humanist subject? To surrender the notion of identity, of self and other as individually determined? Does the plausibility of the posthuman send silent shivers down the vertebrae of the elitist homo sapien? Are realities constructed from an always already individual being or is it that, as Hayles puts it: “autonomous will is merely the story consciousness tells itself to explain results that actually come about through chaotic dynamics and emergent structures” (Hayles, 1999, 288)? To in any way grasp the dimension of the collective through collaborative practice, a path must be traversed through the (trans)individual. The path explored here is selective. It begins with Bergson and spreads rhizomatically.

Bergson’s view from his turn-of-the-nineteenth-to-twentieth century perspective is important in establishing the materialist, and by extension, pragmatic, flavour of thought, even though it is often cast within the constraints of a purely metaphysical frame. He clearly oversteps this frame with his insights on virtuality, movement, intuition and duration. As concepts they share the notion of a qualitative, heterogeneous, yet paradoxically unified, indivisible flow. The nomadic thought of Gilles Deleuze, and Deleuze and Guattari has evolved and deviated from a Bergsonian concept kit of multiplicities. It contrasts with phenomenological platforms favouring intention, presence and intersubjectivity; all precluding an instantiated subject. The line of division is in no way sharply drawn and blurs in the work of Francesco Varela, who straddles several theoretical tributaries.

Bergson makes a distinction in *Matter and Memory* that anticipates further argument with reference to translocal performance when he states "Questions relating to subject and object, to their distinction and their union, should be put in terms of time rather than of space" (1991, 71). Massumi characterises this:

In other words, object and subject, in their mutual difference and reciprocal trajectories, emerge and re-emerge together, from transformation. The everything that has already happened is emergence, registered after its fact in a subject-object relation. Where there was classically and in modernity an external opposition between object and subject, there is now a double distinction internal to the transformation. 1) After-the-fact: subject-object is to emergence as stoppage is to process. 2) In-fact: "objective" and "subjective" are inseparable, as matter of transformation to manner of transformation... (Massumi, 1998, 4)

Massumi makes the case, after Simondon and Deleuze and Guattari, for a dynamic process of subjectivity in which subject and object are other but their relation is transformative to their terms. That relation is emergence. In Felix Guattari's last book, *Chaosmosis*, he outlines the production of subjectivity as *transversal*. He states that subjectivity is "the ensemble of conditions which render possible the emergence of individual and/or collective instances as self-referential existential Territories, adjacent, or in a delimiting relation, to an alterity that is itself subjective" (1995, 9). This is the subject in excess (Simondon; Deleuze), overpowering the transcendental. The subject as constituted by all the forces that simultaneously impinge upon it; are in relation to it. Similarly, Simondon characterises this subjectivity as the *transindividual*, which refers to "a relation to others, which is not determined by a constituted subject position, but by pre-individuated potentials only experienced as affect" (Mackenzie, 2002, 117). Equating this proposition to technologically enabled relations exerts a strong attraction on the experience of felt presence and interaction in distributed networks. Simondon's principle of individuation, an ontogenetic process similar to Deleuze's morphogenetic process, is committed to the guiding principle "*of the conservation of being through becoming*. This conservation is effected by means of the exchanges made between structure and process..." (Simondon, 1992, 301). Or think of this as structure and organisation, which is autopoietic process; the virtual organisation of the affective interval. These leanings best situate ideas circulating through collectives and their multiple individuations. These approaches reflect one of Bergson's lasting contributions to philosophical practice: his anti-dialectical methodology that debunks duality and the synthesised composite for a differentiated multiplicity that is also a unified (yet het-

erogeneous) continuity of duration. Multiplicities replace the transcendental concept of essences.

H-U-H?

Paradoxical overlaps between systems theories and process philosophies provide the backdrop for unpacking the role of individual contribution in collaborative processes implicit in our query. This unleashes a gamut of co-extensive divisions. These biological, social, political and aesthetic dimensions, assert their epistemological and ontological vectors, impacting upon issues that surround subjectivity, collectivity, creativity and ethics. In situating the topological structure and ethos of networks, and in particular, networks that facilitate social and creative interaction in collaborative domains, the characteristics of individuation are best expressed in the qualities and quanta of the shared experience. But how is that experience understood? Are there generic properties implicit in co-operative ecologies that underscore the interactions within them? What are the conditions of experience? How is affect distributed? How is the process of encounter sensed - the co-dependent relationship between environment (the extensive network), becoming-other (intensive sensation) and the emergent relation? How do we co-operate? These questions are fundamental to this project.

The conditions of network structures lend themselves to both descriptive analysis and metaphor in likening decentralised, self-organised activities and emergent phenomena to all manner of interplay and powerplay. They are at once little understood and hypertheorised. Trends in systems theory that herald the paradigm shift from reductionist methodologies towards relational dynamics, add interdisciplinary speculation, quantitative and qualitative, to the humming and hiccupping of social interaction; to questions concerning structural coupling, processual aesthetics and ethical behaviour. A formidable history of theoretical positioning in philosophy, science and the arts has anticipated current thinking on the interfacing and implementation of social and tangible computing and the far-reaching implications of the “always-on panopticon⁴⁹” of globalised connectivity (Rheingold, 2002).

Phenomenologically influenced psychological and neurological research has flourished with respect to computer interface design solutions, spurring semiotic debate. Furthered understanding of our embodied experience of the everyday world is integral to HCI research. “Tangible computing draws on embodiment by recognising the physical embedding of action in the world, while social computing draws upon embodiment by recognising its social embedding in systems of meaning” (Dourish,

2001, 190). This embodied focus takes on additional dimensions when applied to transformation via distributed environments; when the environmental affordances of ubiquitous computing that integrate the invisible with visible/aural/tactile routines are geographically unbounded. An example might be the sleight gesture of a hand controlling the data of a remote environmental change - the volume of a sound system in a room in another city, the brightness of lamp, etc, etc, etc⁵⁰). These activities portend *both* the dissolution and exaggeration of the input/output paradigm. Affective, intersensory recursivity dissolves the paradigm. The hyperubiquitous (ubicom) digital black box exaggerates it. This is the plane on which synchronous, translocal composition resides. Our problematising confronts the complex issue of how affect is distributed through digital networks. This complex issue is complicated by the encroachment of massively mobilised information networks on the absorption capacity of a supersaturated socius. The utopian scenario of networked cultures that loomed large at the turn of the millennium has become for many, a dystopian quagmire of relentless, ambiguous data.

I Heard It Through the Grapevine

Acknowledgement of the power and growth of the interconnected web of the Internet is now, backgrounded to the efficacy of its use and abuse. Questions surface around the translation of self-organised structures to empowered entities; to the constraints and conditions of control; to the boundaries and limits of freedom; to the requisite know-how of human-computer-human-interaction and its affect. Though digital networks have fast become ubiquitous, transparent operands to those in techno-situated cultures, questions persist regarding the intuitive and ethical use of synchronous, connected exchange.

From the focused perspective of interaction design, the conventions of meet and greet are familiar enough, as are the techniques of information push/pull and hypertextual nomadism. There is however, a levelling up for strategic real time, distributed interplay where semiotic narrativity is no longer privileged over the dynamic sensation of non-linear processes. An analysis of this learning curve can be approached from a variety of angles that impinge on the conditions of experience (Deleuze, 1991) and effective complexity (Gell-Mann, 1995) negotiating everything from bandwidth limits to competitive-cooperative frictions. Interplay relevant to models of human interconnection in which the enabling technology is as much a constituent 'subject' or 'part subject' as the living players, can be analysed through a variety of perspectives. Creative interplay will coalesce in polyrhythmic, collaborative practice. Coalesce, amplify and multiply, making distributed creative praxis a

model for investigating the fundamental criteria of peer-2-peer percepts and affects, the shared sensation of process. In the domain of the psyche, translocal interplay is the mediated experience of self/subject through machines. This is, unabashedly, posthuman praxis. In the domain of the social, translocal praxis is the *technicity* of transduction:

A margin of indeterminacy that with technology neither belongs solely to human life nor belongs to some intrinsic dynamism of technology [...] technicity plays a major role in re-evaluating what a technical object is, whether it be a tool, a machine or multi-system ensembles or infrastructures, and thereby opens the possibility of a conceiving collective life somewhat differently. (Mackenzie, 2002, 10-11)

Hence transduction designates both a process that lies at the heart of technicity and *a mode of thought adapted to thinking how collectives are involved* [...] *Transduction names the process that occurs as an entity individuates or precipitates in a field of relations and potentials.* (Mackenzie, 2003 emphasis added)

But it is the interplay of collaborative composing in online, multi-maker environments and the conditions that accrue to constitute a field of potential for emergent aesthetics, that is still naggingly difficult to comprehend. There are important differences between distributed systems and centred (treelike, arborescent) or decentred (hub-style) networks to be considered in order to situate creative interplay. The Internet is a vulnerable example of a non-hierarchical, rhizomatic, distributed system⁵¹. Within its network structure are subsystems that may be decentred (server to client) or specifically centred (one client to one server). Software engineer Just van den Broecke has said, when speaking of the design and development of distributed applications such as KeyWorx:

[...] peer-to-peer (p2p) architectures are often weighed against, and contrasted to centralized client/server solutions. In my opinion no single networking architecture applies. As in many engineering approaches, hybrid solutions that adapt to the requirements of the application are the most promising [...] An ideal multi-user networking architecture should encompass both p2p and centralized elements, adapting dynamically to either one or a mixed approach dependent on the application and the quality of service required by the users. (Doruff, 2003, 78)

This is a pragmatic approach to the efficient sharing and processing of data. It paradoxically jumps into and steps back from Deleuze and Guattari's concept of the rhizome, often referenced in new media theory as the most applicable diagram of the Internet. It attempts to effectively mix and match the bottom-up with the hierarchical from a teleological orientation that interferes, to some degree, with emergent potential. Using the implicit distribution schema of the net, it retains centralised control between a server and its clients for selected functions. This model offers a scenario for network emergence evocative of effective complexity. Recalling Protevi's insights on Deleuze and Guattari's relationship to emergence in Chapter One, this scenario can be fitted to the structure and organisation of technical networks and their socially situated, human participants.

Protevi articulates four configurations of transversal emergence that distribute both synchronic and diachronic emergence. Transversal emergence takes Deleuze and Guattari's terminology to conceptualise a diagonal emergence that intersects and territorialises an assemblage of "organisms, subjects and technological apparatuses" through an assemblage of strata (Protevi, 2005, 14). Hence his playful (if cumbersome) terms –*homeostratic* and *heterostratic*. All four configurations assume a bio-socio-psycho-techno coexistence:

1. Homeostratic synchronic transversal emergence [HomoSTE]
 - a. organic (symbiosis among organisms; ecosystems among groups of organisms)
 - b. social (institutions forming a larger entity: colleges forming a university)
 - c. technical (e.g., computers and routers forming the Internet)
2. Homeostratic diachronic transversal emergence [HomoDTE]
 - a. organic (sybiogenesis...)
 - b. social (system change: change of the university from education of elite into a centre for mass vocational training /military-industrial research)
 - c. technical (system change: from ARPANET to Internet to world wide web)
3. Heterostratic synchronic transversal emergence (a bio-social-technical assemblage) [HeteroSTE]
4. Heterostratic diachronic transversal emergence (mutation and co-evolution of such assemblages in 'machinic phyla' (2005, 14-15) [HeteroDTE]

Van den Broecke's scenario, as a confluence of servers and personal computers,

would constitute a HomoSTE, as he imagines an adaptable and stable p2p framework with selective hierarchical organisation for efficiency. Whether it is synchronic (self-regulating, negative feedback) or diachronic (novel, positive feedback) would depend on its event status, on biological and social components co-operating with the technological. *An event repatterns the virtual*. Arguably, event repatterning is a common occurrence in the systemic organisation of Internet interplay and may potentially imply a HeteroDTE. The network that distributes multi-maker composition is arguably rhizomatic, but does it have the “stuff” of a ‘living’ system?

It is imperative to insist that systems, at least in our context, be understood NOT as homeostatic machines but as quite the opposite, “as an attempt to do away with any usual notion of system, the theory in a way being the deconstruction of its central term” (Baecker, 2001, 61); a leap from the structural to trans-structural; the in-itself of change, of movement, of a body in motion. Though there is little debate regarding the immanent potential of emergent, transformative, properties in living systems, debate rages as to how it evolves; as to whether these properties extend to non-biological systems. Even among system theory’s original thinkers there is division, marked by the applicability of autopoiesis to non-biological, non-organic ‘living’ systems such as Niklas Luhmann’s autopoietic reach to social systems and their emergent communication (Luhmann, 2000). Is information material? Is the interconnected net of digital technologies a biotechnical, “always-on panopticon”? Is power granulated into a socio-digital meshwork or an outside, persuasive force?

The Powerplay of Interplay

In February 2004, an “Info-Empire” debate surfaced on *nettime*⁵² on relational power dynamics and identity in the domain of biological cognition. In their essay “Notes on the State of Networking”, Schneider and Lovink complained:

Maybe it is better to understand networking as a syncope of power, a temporary loss of consciousness and posture, rather than a panacea against corruption, commodification, resentment and the general dumbness of traditional hierarchies. The result of networking often is a rampant will to powerlessness that escape the idea of collective progress under the pretext of participation, fluidity, escapism and overcommitment. (2004)

The issue they have tapped runs deeper than a “temporary loss of consciousness” (presumably self-consciousness) and “will to powerlessness” which may indeed be a precondition of participation in a decentralised net but could as well be its oppo-

site, or none-of-the-above. Large-scale spamming strategies for example, use the power laws of scale-free networks (Barabási, 2002) for their own inscrutable advantage. Examples are numerous. Deflecting the issue of power and control temporarily, the sense of belonging-together between humans and between humans and machines will be pursued. This is the posthuman turn.

One thesis of intersubjective theory posits that we “network” as newborn infants, as early as one-hour young. Observation of newborns renders a proprioceptive awareness through mimesis suggesting that self-consciousness emerges from a preverbal and primordial sense of ‘self’, inseparably coupled to the perceptual recognition of other humans. (Gallagher and Meltzoff, 1996). This argument adds a conspicuous ‘primordial’ sensorimotor prerogative to Lacan’s decentred “I” that is always already Other.⁵³ The case for the open intersubjectivity of consciousness supports an enacted, processual subjectivity:

[...] Had subjectivity been an exclusive first-person phenomenon, where it is only present in the form of an immediate and unique inwardness, I would only know one case of it - my own - and would never get to know any other. Not only would I lack the means of ever recognizing other bodies as embodied subjects, I would also lack the ability to recognize myself in the mirror, and more generally be unable to grasp a certain intersubjectively describable body as myself. (Zahavi, 2001, 162)

Yet “mirror-vision,” however intersubjective, neglects the implications of an absolute, relational continuity. It provides a linear, relative, static image; it lacks movement. The asymmetry of *movement-vision* however, offers this: “It is a discontinuous displacement of the subject, the object and their general relation: the empirical perspective uniting them is an act of recognition” (Massumi, 2002a, 50). Here again is the confrontation with distinctions between a structuralist/psychological (Lacanian) perspective, a sensorimotor phenomenological vision and a ‘poststructuralist’ view. Yet Massumi proffers a breath of air: “The tangent point at which movement-vision meets mirror-vision and diverges from it is the space between the subject-object poles, superposed, fractured, multiplied. *It is relationality in itself, freed from its terms*” (Ibid, 51 emphasis added). This might well look like a bifurcating space between: order peaking at chaos inside order inside chaos; the observation of an observation’s observation. This tangential point on a decentred topology of network interactions, complicates power and control issues and foregrounds cooperative strategies.

Returning to the Lovink/Schneider argument: one vector posits the question of whether control on some level, is a condition of the mutual construction of meaning. Human agency in networks takes on a variegated character when construed in terms of embodied consciousness. In response to Lovink and Schneider's article, Alexander Galloway and Eugene Thacker have pointed out:

Biological or computational, the network is always configured by its protocols. We stress this integrative approach because we cannot afford to view "information" naively as solely immaterial. Negri notes that "all politics is biopolitics," and to this, we would add that all networks are not only biopolitical but biotechnical networks. Protocological control in networks is as much about networks as *living networks* as it is about the materiality of informatics. (2004)

Galloway and Thacker have taken a logical step beyond Luhmann's adaptation of information as systemic, and have determined to define information networks as material, living systems. From this vantage point, autopoiesis can be easily referenced. Biotechnical/biopolitical networks map transversal subjective production and neatly comply with Protevi's criteria for HeteroSTE and key concepts of transversality from Guattari's perspective:

[...] *mobility* (traversing domains, levels, dimensions, the ability to carry and be carried beyond); *creativity* (productivity, adventurousness, aspiration, laying down lines of flight); *self-engendering* (autoproduction, self-positing subjectivity), categories from which one can really take off into universes of reference. (Genosko, 2002, 55 emphasis added)

These criteria not only reflect moving through domains of difference, but also reflect the autopoietic, self-generating quality of subjectivity so vital to ontologies of process. Two parallel developments in the biological sciences in the late 60's opened the door to a fresh look at describing living systems.

Subjective Pluralities

The first tale is of the now infamous slime mould research of Evelyn Fox-Keller and Lee Segel. In 1969, Fox-Keller, then a researcher at Sloan-Kettering, produced the first concrete evidence that some organisms were capable of decentralised adaptation. Lacking a governor cell, the slime mould, a disgusting yellow blob that suddenly appears in gardens, variably functions as an "it" or a "they". Depending on

environmental conditions, in this case changes in cold and damp, it behaves as an individual organism or as a collective mass. Through responsive reaction to the pheromone emission of their neighbours, single cell slime mold entities, when conditions become unfavourable, will change their number from the exploring multitudes to a single organism.⁵⁴ Individual organisms become a collective unity without a pacemaker cell calling the shots. This discovery was groundbreaking. It set a precedent for examining adaptive behaviour in living things that acknowledges the possibility of non-hierarchical collective impulse, of aggregation without a leader (Johnson, 2001, 12-16). This particular example metaphorically suggests the cooperative functions of the autonomous individual and the societal unity in a manner that is ironically, unthreatening to those still attached to the liberal humanist ideal. The cells do recklessly scurry to individuate in optimal conditions. It metaphorically approximates the quantum physics of non-local simultaneity at a distance. It also supplies an analogy for the irreducibility of intersubjectivity, which, for Varela and Thompson is *empathy*: "Thus the open intersubjectivity of consciousness and its concrete articulation in empathy make it possible for us to comprehend an intersubjective field in which there is no one single zero-point or bodily centre of orientation." (Thompson, 2001, 19).⁵⁵ This concept of open intersubjectivity and *empathy* will morph into *affect* and *intuitive sympathy* in the following chapters.

Autopoiesis

The second area of research, alluded to frequently but as of yet undefined, has had broad implications in systems theory, cognitive science and philosophy of mind. It is generally labeled as "second-order cybernetics" and its premise is autopoiesis. The Chilean biologists, Humberto Maturana and Francisco Varela, conceived autopoiesis in the early 70's, as a means of defining the processual, cellular characteristics of living systems. Varela describes this for lay audiences:

[...] Autopoiesis attempts to define the uniqueness of the emergence that produces life in its fundamental cellular form. It's specific to the cellular level. There's a circular or network process that engenders a paradox: a self-organizing network of biochemical reactions produces molecules, which do something specific and unique: they create a boundary, a membrane, which constrains the network that has produced the constituents of the membrane. *This is a logical bootstrap, a loop: a network produces entities that create a boundary, which constrains the network that produced the boundary.* (Varela, 1995 emphasis added)

Autopoiesis represents the recursive circularity of processes within the closed systems (nervous systems) of living organisms. Describing these systems as 'operationally 'closed' is fundamental to this branch of research that presupposes the structural autonomy of living systems and seeks to explain how interactions occur between systems and their environment. Autopoiesis reflects homeostatic synchronic emergence (Protevi). It is an essential component of Varela's embodied enaction theory as it explores cognition from a biological premise. Varela's modified definition of autopoiesis, changed the original terminology of 'machine' to 'system':

An autopoietic system is a system organized (defined as a unity) as a network of processes of production (transformation and destruction) of components that produces the components. At this time, the components have the following characters: (i) through their interactions and transformations continuously they regenerate and realize the network of processes (relations) that produced them; and (ii) they constitute it (the system) as a concrete unity in the space in which they (the components) exist by specifying the topological domain of its realization as such a network. (Varela, 1979)

Critics have suggested that the closed structure of autopoiesis concentrically nests reiterative processing loops to an inaccessible degree (Hayles, 1999). This is one of the contentious links in this otherwise influential theory. The debate between 'closed' and 'open' system analysis lies at the heart of the legitimacy of extending the autopoietic theory of living systems to social systems.

The Observer

The 1970's marked the entrance of the biological sciences into the domain of embodied cognition. At that time there was little exchange between the physical, natural and social sciences with respect to emergent phenomena. Though a detailed explanation of the tenets of autopoiesis are well beyond the scope of this thesis, a few summary propositions are important to grasp. After describing the difference in kind between organisation⁵⁶ and structure⁵⁷ in systems, Maturana claimed that an *observer* is one who distinguishes an entity from a background, a unity from its environment (Maturana, Varela, 1980). He emphasised that "Everything said is said by an observer to another observer that could be him" (Maturana, 1978a, 31; Maturana, 1988, 27). Each observer explains the world, through their experience, to validate that experience. In this radical constructivist epistemology, existence emerges from the actions of an observer. Existence is not independent of the ob-

server's actions in the world. For Maturana and Varela, all explanations are filtered through an observer and each of these explanations acts as a domain of reality, brought forth from the observer's lived experience. Not as a solipsistic perspective, but as an *observer-community* (Varela, 1979, 85) of explanations and realities that generates or brings forth the world (Murray, 1994). Maturana and Varela further delineated the domains of observable interaction and relations between unities, describing the structural coupling (engagement) between unities or systems and their environments.

Recursive Enaction

Autopoietic theory later led Varela to his insights on embodied enaction. For Varela, (a biologist cum neurophenomenologist), living organisms produce emergent properties that continually enfold the world around them into themselves while simultaneously unfolding into the world through the process of structural coupling. This 'enaction' (embodied cognition) sees the organism and its environment reciprocally bound together:

[...] the point of departure for the enactive approach is the study of how the perceiver can guide his actions in a local situation. Since these local situations constantly change as a result of the perceiver's activity, the reference point for understanding perception is no longer a pre-given, perceiver-independent world but rather the sensorimotor structure of the perceiver (The way in which the nervous system links sensory and motor surfaces). (Varela, Thompson, Rosch, 1993)

The situatedness of the perceiver affects action. Varela synthesised autopoietic domains of reality - observer explanations - with a phenomenological approach in which the reiterative history of the subjects' lived experience is inseparable from an objective world. Deleuze and Guattari refer to this as *planes of consistency*, an environment where individuals interact and couple. Observer explanations are also known as *double contingency* (Luhmann, 1997, 103-136): a complex feedback that manifests as reciprocity between subject/object, system /environment, effectively distinguishing and dissolving the binary.

So, it could be said that self-organisation (in cells, in slime moulds, in humans, in networks) and the enaction of embodied cognition share emergent potential through a distributed process. The notion of an objective, understandable world 'out there' is superseded by the idea of the codetermination of perceiver and world.

The tenet of centralised supervision is recast as the symmetrically reciprocal, *situated* flow of local activity and global coherence. The absence of a centre corresponds to Varela's "selfless self" - a coherence that, to an observer appears centrally controlled, but is, according to Varela et al, a decentralised activity emerging from a *virtual* self. He describes this reciprocal causality:

The seeming paradox resides in a two-way movement between levels: "upward" with the emergence of properties from the constituting elements, and "downward" with the constraints imposed by global coherence on local interactions. The result (and the resolution of the paradox) is a nonsubstantial self that acts as if it were present, like a *virtual interface*. (Varela, 1992, 61)

This selfless virtual subject is the ***translocal relation***, a force that inhabits the incorporeal space of the body, intensively and extensively. As an intensive virtuality it may be called: the zone of indetermination (Bergson); the plane of immanence (Deleuze&Guattari); the Body without Organs (Artaud; Deleuze&Guattari); the affective interval, the quasi-corporeal (Massumi); the digital 'Any Space Whatever' (Hansen); the 'whatever' body' (Agamben). When this leitmotif is expanded to include non-organic systems - particularly the transversal machinic assemblage (Guattari, 1992) in a posthumanist context (Hayles, 1999) they become the "biopolitical and biotechnical" networks of Galloway and Thacker. These networks distribute human-computer-human-interaction through the interface of the actualised virtual.

Social Autopoietic Networks and the Blind Spot

The theory of autopoiesis, adopted by the German sociologist Niklas Luhmann, was used to describe interactive processes in social systems. Varela disagreed with Luhmann's interpretation on the grounds that Luhmann denied the participation of the observer, crediting an emergent swirl of communications between observers as the components of social systems, not the observers themselves. Varela's argument for biological cognition is predicated on embodied lived experience whereas Luhmann's approach to social systems sidesteps the subjectivity of the observer by placing her as a carrier of communications through social actions. In Luhmann's system, action is a local event performed by autopoietic actors communicated through a network. Luhmann's approach, still firmly entrenched in its cybernetic roots, views the social system as an autopoietic unit described by its self-producing boundaries. Perhaps Luhmann's most compelling and contentious contribution is

his idea of the observation of observation and the intervening *blind spot* – the unobservability of the *operation* of observation.

An observer cannot see what he cannot see. Neither can he see that he cannot see what he cannot see. But there is a possibility of correction: the observation of the observer. It is true that the second-order observer, too, is tied to his own blind spot, for otherwise he would be unable to make observations. The blind spot is his a priori, as it were. Yet when he observes another observer, he is able to observe his blind spot, his a priori, his "latent structures." (Luhmann, 1994, 25)

This then is the interconnective link between observers, an intersubjective-transindividual-amodal completion of experience. "Only an [other] observer is able to realize what systems themselves are unable to realize" (Luhmann, 1989, 127). As Cary Wolfe insightfully points out: "What is decisive about Luhmann's intervention here is his insistence on the constitutive blindness of all observations, a blindness that does not separate or alienate us from the world but, paradoxically, guarantees our connection with it" (1998, 68).

The conclusion to be drawn from this is that the connection with the reality of the external world is established by the blind spot of the cognitive operation. *Reality is what one does not perceive when one perceives it.* (Luhmann, 1990, 76)

Luhmann's blind spot, our inability to operationally (physically, psychically) observe or perceive the 'now' is fulfilled by the social system – the co-operation of the observation of observation. This social interconnection has similar connotations for Massumi in what he calls the "life-glue" of affect. The interval of the cognitive gap, the half-second blind spot between brain stimulation (matter) and recognition (consciousness) and sensorimotor response signals an interval that is in excess. Signals an excess that may extend beyond the virtual interface of subjectivity. *The blind spot remediated as a transductive process of individuation.* The weak link in Luhmann's theory is the absence of the potential for felt thought, of affect, the paradoxical excess in the vacancy of the 'now' consequent with operationally blinded 'present' perception. Additionally, his critics have claimed this theory is filled with ethical missteps. For Luhmann: all observers are equal, a democratic epistemology but an unlikely reality in which all observers utilise the same resources (Wolfe, 1998, 75-77). This position has ramifications that are taken up in Lovink and Schneider's critique of current networking practice in which the lo-

cal/global tensions of the digital divide surely figure. What is lacking in Luhmann's analysis is precisely what is foregrounded in Bergson, Deleuze and Deleuze and Guattari - creativity.

Autopoietic Transversality

Deleuze and Guattari have remixed autopoietic recursivity to account for the production of subjectivity. "Becoming" is not preceded by "being" - there is only difference and becoming. Guattari in particular, fascinated with the creative generation of subjectivity, said that: "We are faced with an important ethical choice: Either we objectify, reify, 'scientifise,' subjectivity, or, on the contrary, we try to grasp it in the dimension of its processual creativity" (1995, 13). Nudging subjectivity from biology's boundaries and Luhmann's observation of observation into the domain of creative production, they revirtualise it. This transports the production of subjectivity into the domain of the arts, resonating with a rhythm highly sympathetic with the experience of collaborative creativity in network performance.

Autopoiesis deserves to be rethought in terms of evolutionary, collective entities, which maintain diverse types of relations of alterity, rather than being implacably closed in on themselves. In such a case institutions and technical machines appear to be allopoietic, *but when one considers them in the context of machinic Assemblages they constitute with human beings, they become ipso facto autopoietic.* (Guattari, 1995, 39-40 emphasis added).

These machinic *assemblages* demonstrate an even greater societal system than Luhmann conceived, because Luhmann rejected the idea that systems are creative. In Guattari's new aesthetic paradigm humans are seen as autopoietic machines that self-produce worlds with ethico-political implications, bifurcate "beyond pre-established schemas" (Ibid, 107) and take responsibility for the creative instance that produces created "things." Artists and intellectuals in this ethico-aesthetic paradigm produce toolkits, not objects or products - toolkits of "concepts, percepts and affects" for diverse publics (Ibid, 129).

Patently, art does not have a monopoly on creation, but it takes its capacity to invent mutant coordinates to extremes: it engenders unprecedented, unforeseen and unthinkable qualities of being. The decisive threshold constituting this new aesthetic paradigm lies in the aptitude of these processes of creation to auto-affirm themselves as existential nuclei, *autopoietic machines.* (Ibid, 106 emphasis added).

This creative self-producing of the new, the novel, when applied to the production of subjectivity must affirm a plastic, virtual, identityless organisation. This is Deleuze and Guattari's transversality. In Protevi's schema, Guattari's autopoietic machines comply with the potential for HeteroDTE, imbued with the powers of mutation and evolution. The originary or classic autopoiesis is problematic:

The critique of identity-based thinking developed in Deleuze in 1968 posits life as virtually creative, that is, posits pure difference or differentiation/differentiation as the horizon for change. For autopoietic theory, living systems conserve their organization, which means their functioning always restores homeostasis; evolution is merely structural change against this identity horizon. For Deleuze, life is virtual differentiation ceaselessly differentiating in divergent actualization; *the self-identity of the organism, preserved by homeostasis, is just an expression of the necessity of dipping into actuality in order to provoke the next burst of virtual creativity.* (Protevi, 2005, 18 emphasis added)

At first glance this complicates a reading of Simondon's individuation as he insists on "the *conservation* of being through becoming", yet that conservation is not one of identity, of form or substance but it is "the being [...] as a tautly extended and supersaturated system, which exists at a higher level than the unit itself." (1992, 301). What is conserved is not substance but the *movement* of a transductive unity:

[...] occupying only a certain phase of the whole being in question - a phase that therefore carries the implication of a preceding individual state, and that, even after individuation, does not exist in isolation since individuation does not exhaust in the single act of its appearance all the potentials embedded in the preindividual state. (Ibid, 300)

This out-of-phasedness is the excess from which subjectivity is produced in a system. It is otherwise described as the creativity of affectivity or "the modality through which the individuated being remains incomplete [...] open to the force of the preindividual, to that which it is not, or more accurately, to its own constitutive excess" (Hansen, 2002, 266). Guattari, in his last published work, dramatically appeals to creativity as the means of overcoming homeostatic self-referencing. This appeal resonates with the tools produced by artists that purposefully experiment with transductive composition in transversal networks:

The future of contemporary subjectivity is not to live indefinitely under the regime of self-withdrawal, of mass mediatic infantilisation, of ignorance of difference and alterity - both on the human and the cosmic register. Its modes of subjectivation will get out of their homogenetic "entrapment" only if creative objectives appear within their reach. What is at stake here is the finality of the ensemble of human activities. Beyond material and political demands, what emerges is an aspiration for individual and collective reappropriation of the production of subjectivity. (1995, 133)

Here is the *raison d'être* for socially invigorated technical tools that enable creativity. It is here, in the individual and collective production of subjectivity that the complex polyrhythms of translocal composition resonate.

Part One: Conclusions

Question: What do systems - complex, synchronic, diachronic, transversal, autopoietic, social - have to do with the performative production of composition?

Answer: Everything.

The preceding survey of key concepts in systems theory aims to situate performance practice within the discourse of *emergence*. Systems theory provides an historical catalysis for the "emergence" of the new in a panoply of differentiated systems and networks. The transdisciplinarity of systems theory and its attendant discourse on the nature of emergence, creativity and subjectivity directly impacts the way we think about performance; impacts the way we negotiate the social and creative implications of real time collaborative, networked composition; impacts the way we imagine our autonomous bodies in their spatiotemporal situatedness in relation to the world; impacts the very notions of individual, collective and technically mediated *connectedness* and *disconnectedness*. System theories, from various sciences, inform processes of becoming-other. A handful of philosophers and cultural theorists have elaborated on multiplicities, singularities, bifurcations, strange attractors, self-organisation, temporality, cognitive latency, etc., to address pragmatic, meta-physical concerns that offset and complement the empirical abstractions of science. These queries are expressed in the arts and intersect performance and the LiveArt genre in significant ways.

The creative event is a quantum leap that supersedes mere development. The creative event is the emerging force of emergence. "*The event is everything*. There is no subject before or behind it whose deed it would be. It is an autonomous doing [...]"

The triggering of the charge is a movement immanent to the field of potential, by which it plays out the consequences of its own intensity" (Massumi, 2002b, xxiv emphasis added). Performative composition is asignifying *eventness*. Action, movement, affect is nonrepresentational knowing; is in a sense, superempirical to representation. The event produces meaning without the baggage of signification. It generates the force of a translation process, as Deleuze and Guattari would have it. The reciprocal actualisation of virtualities in the compositional frame of multi-maker performance is readily referenced in process philosophies and complexity science. To evaluate an event of HeteroDTE in systems and subsystems of performance making, it is necessary to outline the expansive, complex, dynamic components that inform the discussion.

Are individuating systems with emergent potential autonomous; and if so, how do they belong-together? It has been suggested that within these networks, the relation (between terms), the virtual in-between, is ontogenetic, autopoietic and autonomous. Rethinking the biological, cellular autopoiesis of living systems, the feedback mechanisms that generate the new in a recycled future-past, one can imagine transversal networks of humans and non-humans continually moving in and out of phase with their homeostatic states. It therefore becomes possible to situate one's concepts and experience in a posthuman paradigm that leaps from its structuralist, phenomenological and poststructuralist heritage. One can comfortably situate within posthumanism with the implicit understanding that situating is not positioning, that it is dynamic and self-varying and assumes no foothold other than a passing through.

How does the transindividual performatively distribute its ontogenetic expansiveness? "To tend the stretch of *expression*, to foster and inflect it rather than trying to own it, is to enter the stream, contributing to its probings: *this is co-creative and aesthetic endeavor. It is also an ethical endeavor, since it is to ally oneself with change: for an ethics of emergence*" (Massumi, 2002b, xxii emphasis added). Polyrhythmic expression begins to take shape as an ethico-aesthetic.

Hinge I

Translocal Interplay and KeyWorx

[...] a hinge, a point of exchange between a mechanism of power and a function; it is a way of making power relations functions in a function, and of making a function through these power relations. (Foucault, 1977, 217)

Digital technologies are hinges between human power mechanisms and algorithmic functions. Some technologies are hinge-dimensions situated between a virtual tendency and an actual experience. To situate performance practice, enabled by Internet protocols and real time digital processing tools, it's convenient, momentarily, to refer to recognisable new media classifications. "Augmented Reality" (AR) is one such loosely outlined genre. Like many terms that emerged from the digital media sector in the 90's, the term "new media" is itself an ossifying descriptor for this domain. AR generally refers to applications that overlay computer generated text and graphics on live video images of "the real world." Hazarding a definition that fits the context of enquiry here: *Augmented reality, in the frame of translocal compositional interplay specifically, but not exclusively, combines real world analogue input, computer generated data and the translation of analogue to digital data. It has the potential for dynamic change through algorithmic and indeterminate processes.*

However, the term *augmented reality*, suggests an ambiguity that inappropriately complicates the goals of this research. Reality, in our perspective, is not necessarily 'augmented' by technologies, but rather autopoietically incorporated with them; a transversal emergence of the biological organism, its social situatedness and its technicity. "The hallmark of a transductive process is the intersection and knotting together of diverse realities" (Mackenzie, 2002, 13). This convergent catalysis, in a collaborative setting such as KeyWorx or other translocal compositional environments, enables combinatorial processes of social interaction and synchronous composing in translocal dimensions. Video, audio, still images and texting are the most commonly used media formats, but the field is open to a wide range of input possibility. Algorithmic generators, modifiers, analysers and data feedback are also readily instantiated. Translocal practice is not telematic practice. Not to be understood as telecommunications or telepresence. Its aim is not broadbandcasting an event or mediating absence. Techniques that address these issues are often conventionally understood as "virtual presence". *Yet a sense of presence is not given, it is enacted.* This is the context of a multi-maker KeyWorx enabled composition. It is the virtual extensivity of translocal performative action.

Co-operation and Control in Collaborative Composition

Trust, empathy and co-operation are endemic to any functioning collaborative environment or system that scales up from the binary, (gridded, “nearest neighbour,” on/off rules of cellular automata) to engage in multi-dimensional interaction. Arguably, artists controlling media parameters in shared, co-authored ‘ecologies’ are interested in co-operative reciprocity as a precondition of their engagement in a collective scenario. Competitive “beauty-bashing” or proprietary aesthetics are misplaced in interauthored compositional processes, especially those challenged by proximity. Co-operation involves the rhythmic play of consensus and dissensus waged through differentiating and differentiating with an affective ‘gluing⁵⁸’ substrate that bonds the composing. One might call the method of interaction *intuition*, or alternatively *transduction*. The expression of this transductive intuition is nonetheless impinged upon by layers of *protocol*:

A computer protocol is a set of recommendations and rules that outline specific technical standards. Prior to its usage in computing, protocol referred to any type of correct or proper behavior, within a specific system of conventions [...] in familiar usage the word came to mean, any introductory paper summarizing the key points of a diplomatic agreement or treaty [...] Now protocols refer specifically to standards governing the implementation of specific technologies. (Galloway, 2003, 6-7)

The correct or proper behaviour of protocols referred to by Galloway is enacted in the performing arts, when improvisatory compositional practices among several participants are employed.

Protocols are strategies or agreements which “glue” events together (after the Greek *protókollon*, a first leaf glued to the front of a manuscript and containing notes as to its contents). These guidelines, *whether explicitly stated or implicitly embodied in the mode of expression*, ground the play of improvisation in performance situations and [...] signify expertise. (Soules, 2001 emphasis added)

Intuitive, transductive, protocological: certain notions played with here in order to evoke an in-between substrate, a gluing mechanism that bonds the durational vectors or lines of flight in the becoming of a system. Massumi evokes the same gluing metaphor when describing the intervallic, between-space of affect as a Lorenz-like butterfly effect. As a strange attractor:

[...] chaotic self-ordering depends on a "sensitivity to initial conditions" no matter how far the system has drifted from its initial terminus. What is this openness to being affected by a previous process? Is not this enduring "sensitivity" a connecting thread of affect meandering impersonally through the world? *World-affect: life-glue of matter*. (Massumi, 2002a, 227 emphasis added)

The issue of control (power) is convoluted in artist-made software. The question of "who is driving" – the programmer (often an artist) or the end-user (often an artist) – is sticky. Algorithmic constraints placed by the programmers and designers guide and limit the experience of the artmaker. Software interaction design is implicitly teleological. Programming languages operate within the constraints of syntax and its lexicon. They are locally procedural, generating strings of functions that tweak parameters and glue components together. Ontologies are ascribed to technological frameworks for semantic integrity. Though programming ontologies resemble their philosophical namesakes, they are more rigidly constrained to the realisation of possibilities rather than the actualisation of potentialities. There can be many different types of constrained planes however. Software applications or projects that fix or predetermine the range of outcome are categorically different in kind from applications that function as authoring tools. And authoring tools such as Max/MSP, Proce55ing, pure data, Image/ine, Isadora or KeyWorx, are different in kind from bioart experiments with emergent coding such as Tom Ray's *Tierra*⁵⁹ or Casey Reas' *Microimage*⁶⁰. These emergent codes use autonomous software elements interacting and mutating in the ecological complexities of their software environment. Applications geared to enable performance practice provide a toolbox of real time intermedia filters and modifiers that address at least two levels of interaction perception. Participant interventions, or publicly controlled parameters in installation settings, are often restricted to reactive states in which the range of input and output behaviour is tightly restricted. Adding multiple human players creates a new set of variables that could, through repetition and learning, provide transformative conditions between media and humans.

Inverting the hierarchy of lower (code) and higher (user) level feedback turns up the event-potential of "out-of-control", a state reminiscent of chaos in a self-organising process. Steven Johnson, when speaking of what he terms the "joystick generation" conjectures:

[...] I think they have developed another skill that almost looks like patience: they are more tolerant of being out of control, more tolerant of that explora-

tory phase where the rules don't all make sense, and where few goals have been clearly defined. In other words, they are uniquely equipped to embrace the more oblique control system of emergent software. The hard work of tomorrow's interactive design will be exploring the tolerance -that suspension of control- in ways that enlighten us. (2001, 177)

KeyWorx is a coded system. It has a structure that couples with Internet protocols and the humans that instantiate them. It has an organisation of components, its own virtual dimension.

The developers of KeyWorx had a vision – real time, synchronous, multi-maker media processing over the Internet. Social composing with all the “bells and whistles” of digital filtering and modification. What was a bluesky vision of collaborative agency in 1996, has been exponentially actualised by numerous technologies enabling everything from massively populated multi-user online games to bitTorrent p2p file sharing in recent years. The Free/Libre Open Source Software movement (FLOSS) and the Creative Commons alternative to Intellectual Property constraints inject an ethical code into the far-reaching continuity of computer code that must autopoietically build upon itself within a broader *ecosophy*.⁶¹

KeyStroke in 1999

The following texts outline the ambitions and development process from KeyStroke to KeyWorx. The initial funding proposal was submitted in 1996. The project was officially launched by Waag Society in January 1998. The first essay was published in *Performance Research* in 1999. It was written when KeyWorx was called KeyStroke and was more of a concept than an actuality. It is included here, as a description of a development that had strong ideological associations. There were allusions to chaos theory, conjectures about synaesthesia. Later descriptions paint the process in more pragmatic tones with regard to the potential of networked collaboration. Some of the questions posed in the early research period have been answered but most remain in the limbo of acknowledged quandaries.

Although the following short description of the project was written in the project's infancy, it reflects an ideological goal. Napster, the first peer-2-peer file sharing initiative was launched in June of 1999 when Internet protocols evolved and the vision of a socially viable networked society was flourishing. Descriptive language such as: “nested wholes - enfolded entities which are in a continually fluctuating state of unfolding to reveal their component parts”, represented a somewhat imma-

ture framing of the structural organisation of the technicity. Nonetheless, a vector was created from which the concepts in this thesis have emerged. The ontological lineage sprang from chaos theory and cybernetics at that early juncture. In 1999, the interface was not-yet functional for multi-maker interplay so the illustration (Figure 2) was a graphic mock-up of a potential scenario. The decision to use spiralling icons in the GUI (graphic user interface) or Patcher as it was called in KeyStroke, was a design solution to a philosophical problem. The spirals represented media objects (video, audio, keyboard, mouse, etc), generators (oscillators, random and envelope generators, etc) and filtering/analysis modules (scale, offset, dissolve, displace, spectrum analysis, etc) and their parameters which were drag and drop spheres exposed on the spiral objects.⁶² The design conundrum: How to represent the potential internal/external expansiveness of an object and its parameters beyond the black box stranglehold of the input/output paradigm? In other object-oriented languages such as Max/MSP, objects are generally depicted as rectangular forms with input/output entrance and exit locations, which reinforce that paradigm. The unfurling spiral was thought to be a symbolic step to a fresh view of indeterminate behaviours that looked beyond the constraints of back-end black box.

The KeyStroke Project

(Doruff, 1999) published in *Performance Research*, "On Line" Edition; Ric Allsopp and Scott Delahunta, eds, Vol. 4, No. 2, Summer 1999, pp. 103-106

Research and development of new technologies often involves an exploration into metaphorical analogies of a goal. These analogies are useful for establishing a kinetic *raison d'être* for a project; a bigger picture, a broader scope of intention that leaves room for a concept to grow and adapt beyond its initial vision. In this regard, KeyStroke is as much a process as a project. An investigation in two main areas - optimal synthesis of digitised media and realtime collaborative methods.

KeyStroke is an instrument, a tool, an approach to non-linear connectivity within the socio/cultural structure of a group dynamic. It is also an experiment in practical systems theory that in many ways mirrors the metaphors of current philosophical/scientific thinking, from chaos theory to the holographic paradigm. It reflects a finger on the collective pulse in which current philosophical concepts can be referenced in the everyday by the ubiquitousness of digital technology. Constructed as a malleable environment for creating live, collaborative multimedia performances, it is a vehicle for simultaneous experimentation with cross-media interaction and social interplay. A 'jam session' with images, sounds, and text. A media conference

call for artists, designers and performers to work ideas in a realtime context. A playstation for sensory synthesis. A framework for live performance interaction that allows a pervasive scope of artistic and communicative utilities and techniques.

The Design Concept

A multi-user software application, KeyStrokes' concept and design are built on the holarchical premise of nested wholes - enfolded entities which are in a continually fluctuating state of unfolding to reveal their component parts. Each part of each whole is in a dynamic state that may be influenced, altered or modified by any other part of any other whole, modelling the interrelatedness of all matter at all times.

Creativity is an integral and evolutionary catalyst of this dynamic process - a kind of randomizing engine that produces change, growth and unpredictability. In KeyStroke the players provide this element by choosing and filtering connections in a shared, realtime environment that can be both scrupulously determined and unforeseen. The players themselves form a nested collective as actions made by one effect the experience of the whole (Performance) in obvious and/or subtle ways over the duration of play. A small alteration by one player in the value of one component media property can create significant ramifications in the performance, exhibiting a 'sensitivity to initial conditions' otherwise known as the butterfly effect of chaos theory:

The flapping of a single butterfly's wing today produces a tiny change in the state of the atmosphere. Over a period of time, what the atmosphere actually does diverge from what it would have done. So, in a month's time, a tornado that would have devastated the Indonesian coast doesn't happen. Or maybe one that wasn't going to happen does. (Ian Stewart, *Does God Play Dice? The Mathematics of Chaos*)

In KeyStroke, these nested wholes are analogous to different types of digitised media and their extractable component properties. This function has a visual corollary in the GUI in which each object is a spiral or helix form which when unfurled by a simple mouse rollover, reveals all the component properties specific to its type.

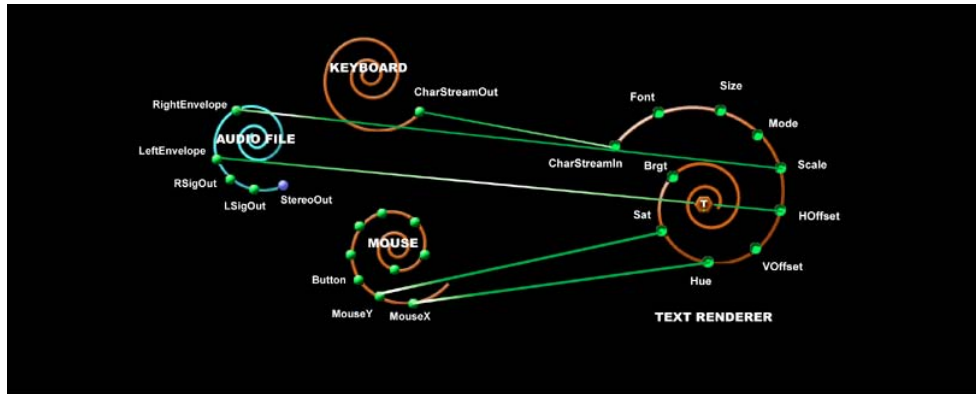


Figure HI.1: Example of the media spirals and their properties. Here a player is sending a text stream and will control its Hue and Saturation with mouse position. An audio file downloaded from the session File Library is controlling the size (Scale) and screen position (HOffset) of that text. These connections could represent one aspect of a more complex patch.

The architectural foundation of KeyStroke is based on modularity. These media modules coexist and interact by player control within the multi-dimensional sphere of cyberspace, of networked forms of expression. The notion that the resultant synthesis of the component parts or properties of different types of media (video, audio, text, graphics, etc.) may yield interesting and unexpected artistic results is central to its design. But the control of these results is spontaneously driven by the artistic, emotional and intellectual dynamic of the players involved and places a premium on the social context, the behavior and interplay of the controllers. This mixture, or delicate balance, of control variability and media synchronicity are the cornerstones of the project.

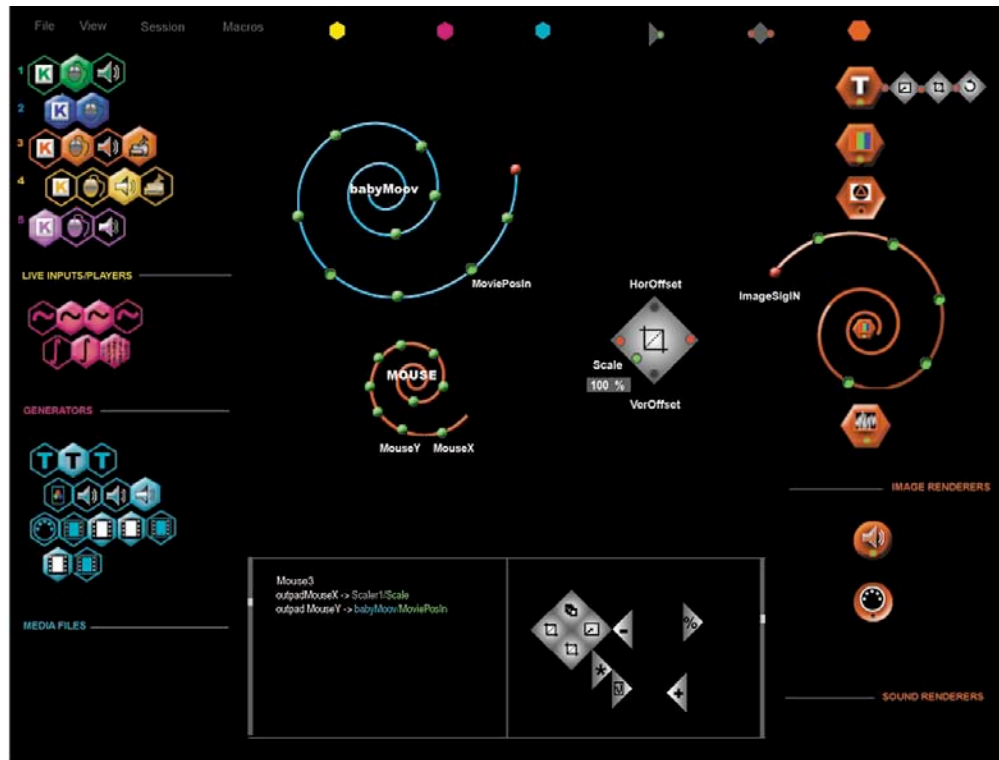


Figure HL.2: Simulated screen shot of a typical KeyStroke session.

An Example Patch

Let's take an example performance setup that involves a theatrical space. Live video and audio of a dance performance is streamed to a battery of five KeyStroke artists (musicians, poet, media designers, etc.) who interpret and control this source material in a variety of ways. One player may choose to layer the video source of the dancer with prerecorded movie clips. Another player may decide to modify the sound source from the dance performance with a delay filter while another types comments and another adds sound samples to the mix. Control of these elements is always interchangeable so that one player may decide to scale the incoming text with her mouse while another changes the color and screen position of the text with a midi controller. A decision is made by a player to 'scratch' the movie position of one clip with the mouse of another player. Perhaps the dancer modifies the vocal input of a singer with ultrasound sensors. All of this activity culminates in the Realizer, which in KeyStroke is the performance or display of the constant interactions of the oscillating components of digitised media.

Conclusion

The unpredictability of the synthetic process is certainly a provocative element in the play of KeyStroke. But the truly maverick agent in the process is the group dynamic. Will disparate communities form around issues of friendly improvisation or structured linear development? Will players routinely compete for control or abdicate control in favor of a defined group aesthetic? Will we face an extensive learning curve in collaborative etiquette? How will we respond to sensory cacophony? KeyStroke poses these questions and hopes to pass on new insights as the program is introduced this spring/summer to a core group of artists, performers and researchers.⁶³

The KeyWorx Framework in 2005

The following essay appeared in the 2005 publication from V2_:Institute for Unstable Media, a major cultural institution for media art, based in The Netherlands. It was commissioned to provide an overview of the collaborative process of a collaborative concept – the making of a multi-maker software application. Since its conceptual inception in 1996, the KeyWorx project has grown from a small core team to a large “team” of engineers and “users as designers” based at Waag Society, Amsterdam. This article gives a straightforward description of the people involved in building a software architecture. It describes the transition of the project from an artist tool to a parent platform from which several spin-off applications have sprung. The point of view taken in this account, focuses on the roles of the engineers, programmers, project managers, and artist beta testers. Though the role of the initiating artist(s) was instrumental to the projects *becoming*, its sustainable patterns, over an eight-year period, suggest a complex, far from equilibrium R&D system. As the artist initiator of the project, from conceptual inception through long-term project development (including interface design and project management from 1998-2002), this software represents a significant period of artistic practice. The interviews with software engineers Demeyer, Bogaards and van den Broecke are extracted from longer interviews conducted in 2002 (Doruff, 2005c).

Collaborative Praxis: The Making of the KeyWorx Platform

(Doruff, 2005a) published in *aRt&D: Research and Development in the Arts*, Joke Brouwer, Arjen Mulder and Anne Nigten, eds., V2_/NAI Publishers, Rotterdam, 2005

Introduction

There is no single methodology, no general description, that aptly depicts the making of a collaborative tool by a collaborating team. The process is as variegated as the personalities of the contributors and as fluid as the dynamic socio-cultural-economic ecology it inhabits. The working light that fills the lab on summer afternoons and streaks from desk lamps during the short days of winter, the proximity of workspaces to each other and the coffeemaker, shifting ambient sound landscapes, disappearing funding, aging equipment, new protocols, battles, brainstorming and broken cables all factor into the daily practice of working together. If one were to chronicle the hundreds of planning meetings, impassioned debates, demo disasters, external negotiations, the internal chaos and the nanoseconds of inspired synergy that make all the difference, the result would read pretty much as what it ultimately is – a sample cluster of purposeful social interaction in a creative context.

This project, spanning seven years, has naturally evolved along distinct strands. It began with the ambitious short-term goal of developing a multi-user collaborative tool for digital artists. Over time, it has migrated to an open-source technology platform, supporting the creation of potential multi-agent, multi-channel client applications across all sectors: the arts, education, business and service industries.

A Condensed History

In 1996, a group of four artists approached the fledgling Society for Old and New Media in Amsterdam to ask it to sponsor their proposal to create a tool that would enable interdisciplinary artists to collaborate in a virtual studio space on the Internet.⁶⁴ The proposal drew support from the Amsterdamse Fonds voor de Kunst and began to take shape, refine its goals and re-establish its team in 1997, under the guidance of Marleen Stikker and Carolien Nevejan, then codirectors of the SONM, which was renamed Waag Society for Old and New Media in 2002.

For the project, initially called KeyStroke, three programmers were recruited as programmer/developers: Tom Demeyer from Stichting STEIM⁶⁵ in Amsterdam, whose BigEye and Image/ine applications set an early standard for real time interaction; Just van den Broecke from AT&T and Lucent Technologies, who had exper-

tise in multi-user technologies, and Niels Bogaards, an intern studying music technology at the HKU Hilversum. Each was to be responsible for the development of a component of the original framework – they were Realizer, Server and Patcher respectively. As the artist developer and project leader, I designed the user interface, defined and presented the concept to the public, test-drove the application in performance situations, facilitated workshops and drafted endless subsidy proposals. The programming team expanded over time to include Lodewijk Loos, Fokke de Jong (both music technology graduates of HKU Hilversum), Ben Soree (who studied graphic design at the Rietveld Academie Amsterdam), Eric Redlinger (a Brooklyn-based digital artist) and Arjen Keesmaat (of HKU EMMA). Klaas Hernamdt, Director of Operations of Waag Society, took over general project management in 2002.

As is often the case, the start-up funding was woefully insufficient for the task at hand. In the late 1990s, support for nonprofits engaged in technology development for the arts was little understood, and validation of the "art of code" was still hotly contested.⁶⁶ With brave conviction, the Waag Society, a nonprofit cultural institution, remained committed to the project, digging deep into its own pockets to sustain its development. That commitment has paid off in many respects, as the technology is now the transparent framework for a large percentage of Waag Society projects.

For the first three years of the project, the small core team of four people worked part time, one or two days a week, with the exception of Bogaards, whose full-time internship and eventual employment provided a vital cohesiveness. But there was an inherent splintering in the development process, in the modular design itself and the fabrication of it. The contingencies of the working-alone-together model that was pragmatically adopted elicit interesting analysis within the larger context of collaborative process.

So, too, the emerging network of contributors forms a community structure. Artists interested in the concept of synchronous collaborative spaces on the Net have been critically important as members of the extended team. Their continued alpha and beta testing, often under stressful performance conditions, and their suggestions for new plug-ins and design improvements have advanced the R&D beyond the vision of the Waag Society developers. The ad-hoc contribution of the artists/end users has been, and continues to be, essential to the development of the tool⁶⁷, in many ways redefining the very notion of R&D teamwork.

What Is It?

The KeyStroke⁶⁸ application was designed for multi-agent, real time, distributed, synchronous performance by new media artists. In effect, it is a tool for multimedia, telepresence experimentation and jamming. It was built for the Macintosh OS utilizing C++, Java and XML languages. In 2003–04, the Waag Society began merging KeyStroke with its KidsEye framework to build an extensible platform for a wide range of multi-agent functionality, synchronous and asynchronous. Programmer Ronald M. Lenz (of the chemical engineering department, TU Delft) contributed the integration of a content management system implemented in the KidsEye⁶⁹ project, and Van den Broecke designed a user authentication system for managing agent permissions across individual spaces. ScratchWorx⁷⁰, a spin-off hardware interface designed by HKU EMMA students with technical support from Waag Society, further extended the reach of the platform to a youth target group. Early 2004 saw the completion of the open-source platform under the Mozilla Public Licence, GNU General Public Licence and GNU Lesser General Public Licence triple licence agreement.

The original KeyStroke/KeyWorx combined a distributed multi-agent, multi-channel environment with dynamic cross-media synthesis, providing the tools for extensible forms of telecommunication, telematics/telekinetics, interactive broadband and collaborative performance. Its ability to synchronously synthesise media in a translocal workspace makes it a powerful live performance tool for remote interaction and interdisciplinary work. The new open-source KWart (which will replace the KeyStroke/KeyWorx protocol) will add the possibility of asynchronous content management (CMS) to the functionality. A description of the platform is beyond the scope of this article. For more information see the white paper by Van den Broecke.⁷¹

Collaborative Process and Design Approach

The working-alone-together praxis – a modular method for a modular architecture – that this team adopted in the early years of the project for pragmatic, financial and personal (i.e., long-established individual working patterns) reasons represents a curious corollary to certain aspirations of distributed collaborative learning and performance software environments. At issue is the method of recursive collaborative process; specifically, how the KeyWorx team "collaborated" on a technology designed to enable "collaboration" between interdisciplinary artists and how those production methods and values are interfaced to the end users.

That the team feels the development process would have been enhanced by working in close physical proximity is evidence of the learning curve immanent in qual-

ity remote interaction. It is also evidence of the infrequency of the collective use of the application by the makers. This implies that not all developers have a stake in using the technology they're making, and that programmers and developers evaluate their work from different microscopic lenses. When polled, in 2002, the KeyWorx team unanimously felt it would have expedited the project if they had all worked in the same room. That's a poignant remark about a project focused on facilitating remote collaboration. Ostensibly, though, the programming process is dissimilar to the user experience of the software, so a strict corollary is misguided. Interestingly, the process of enlarging (through the addition of CMS) and open-sourcing the platform from 2002 to the present has meant a change in the lab configuration, working conditions and methods. Programmers mainly work full time and in earshot of one another, with a fairly conventional project management overview. Lenz and Van den Broecke have adopted an extreme programming approach to the expansion of the platform. This metamorphosis is reflected in the open-source product. Lenz explains that in talking through what you're doing together, "you don't necessarily get better code, but you do get a better architecture."

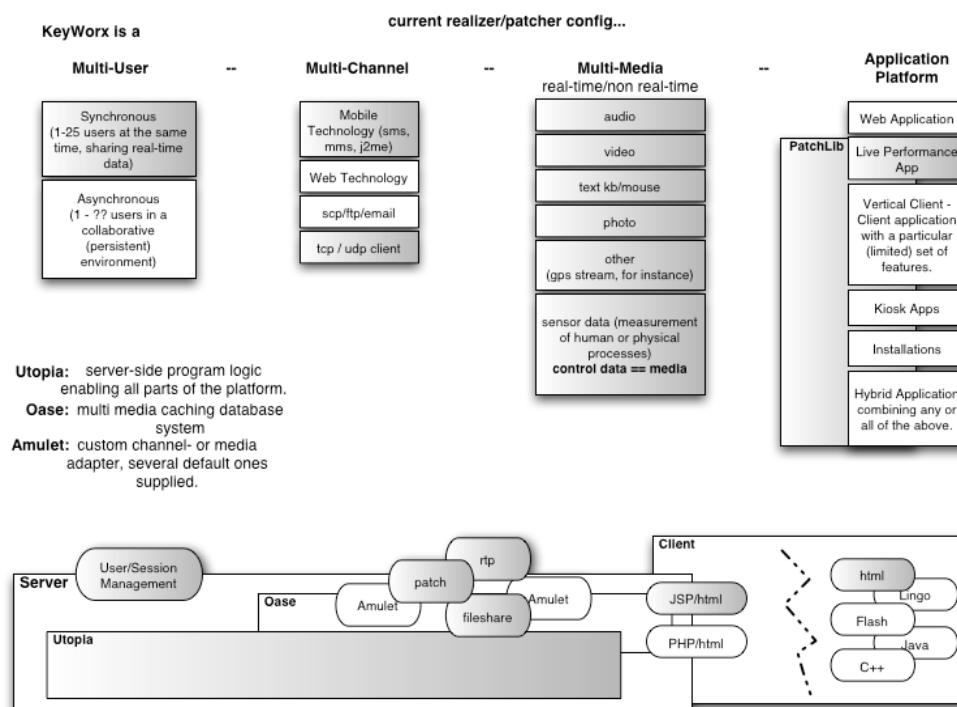


Figure HI.3: Diagram of the KeyWorx architecture

The Programmers' POV

The perspective of the programmers is often overshadowed in discussions of artist software and technologies by the aesthetic aims of the development. Most developers would agree that the style and design of the back-end code is every bit as "aesthetically relevant" as the front end. I interviewed the three core programmers of KeyStroke/KeyWorx individually in 2002⁷² and asked them questions about the development process in relation to the desired functionality of the application. I posed questions concerning the mirroring of the development methodology in the product, and how and where the collaborative development process – the making together – is evident in the design, functionality and aesthetic of the application. I asked if the strengths, weaknesses, idiosyncrasies, styles and philosophies of the development team were present in the functionality of the tool and the way it interfaced with the user. Here, I include a selection of answers regarding the collaborative development process as well as a reflective comment by Marleen Stikker and myself.

Tom Demeyer

SD: How is the development process mirroring what we now have in KeyWorx?

TD: The process is mirroring the characters of the people, mirroring the code. We're solitary programmers (well, Just van den Broecke less so). We've always programmed by ourselves; we've never been part of a big team of programmers – this is just a clever trick for avoiding that. We just do our own thing, while still being part of a team. If we really worked together the whole time, we wouldn't have as many problems as we do in the multi-user department, because we'd be testing much more while we're doing it. [But] since we're working alone, you may have this good idea and work a long time, but when it all has to come together it fails, and it turns out that it wasn't ever possible. I think this might be the central disadvantage to working this way.

SD: So if you're working on a multi-user application you should be developing in a multi-user environment yourselves?

TD: Yes. Or you have to set a very rigid multi-computer environment for yourselves. When you write code, you're a very casual user as well, on submicroscopic bits of the code. You're using it to test the validity of the code, the assumptions, but you're using it microscopically, not anything like an end user would use it. It's just small tests. In a multi-user bit of code it's not possible to do it yourself. In these kind of programming environments like the Waag, it's always true that the process also reflects the character of the people, the way they work together – it all reflects in the end product, there's no question about that. That's why you won't ever see big corporate structures writing innovative software.

Just van den Broecke

SD: How is it that you three programmers have collaborated on a piece of collaborative software? How much is that process reflected in KeyWorx? In this particular case you have a collaborating group of people working on an application that's about collaboration.

JvdB: For one thing, the multi-user aspect has been greatly underestimated, and for some people it's something like a side artifact. For example, to the Realizer, to put it bluntly, it's another interrupt. I had the same thing when I started working on multi-user, because I came into this group at AT&T and moved internally to another group (working on multi-user), and said, "What's the big deal? You send some stuff to each other. Why are you working with hundreds of people on this with these thick documents?" But when I started working on it, I realised, for one thing, that what I underestimated was the number of failure modes that can arise. At that time we developed user interfaces as a side effect to access the system, [rather than] starting with users first. Maybe that's what also happened here. There were already so many issues to solve. And for me, from a network point of view, I tend to develop from the inside out. But to answer your question, I think the approach is reflected in the product.

SD: With this particular application, I wonder if there shouldn't have been more play, or interplay, from the very beginning amongst the team?

JvdB: That's also something that happens a lot with programmers - they make something for someone else. But again, this is also a criterion for good architecture: eat your own dog food. Would you use this yourself as a product? I think our intention is to do so.

Niels Bogaards

SD: Would it have been better to be working in the same space?

NB: Sure. If you're all in the same room, or at least at the same level of intensity, then you can also excite each other. Whereas now, everyone has their island, and you don't know what's happening on the other island, more or less, and then you're unsure if things that happen in the other parts are sound, even. It leads to a situation where you think, "Maybe it's better if I do that."

SD: How does the development process effect a KeyWorx session? Does your frustration reflect in the design of the application?

NB: I don't have the same feeling, because it's not the same people I'm in the KeyWorx sessions with, and very often they're at the same or higher level of intensity than I am, so that doesn't really apply. I still very much agree with the ideas behind the application. I think almost everything we decided after one year of thinking is still true ... I'm not at all disappointed with the genre or working with the applica-

tion. It's the most exciting thing I know of. I know that I can have real fun in KeyWorx, and I know that others can.

Comment by Marleen Stikker

This is the only project where people are really angry about certain decisions about software. I really love it. That makes so much sense. To me it's what it we are all about: that choices in software are not objective choices, that they're subjective and exclude certain possibilities and enable other possibilities. That's my interest and why I'm doing this. To me, the KeyWorx team is the living example that software is culture.

Conclusion

My semantic relationship with the term "real time," has profoundly transformed since 1996. In the mid-1990s, "real time" interaction promised the extraordinary opportunity to dynamically process media states without rendering times that approximated the lifespan of an insect species. Now "real time" is a ubiquitous, transparent functionality, and the term itself is nearly obsolete. My current relationship with this term has more to do with questioning what we thought we meant by the concept of "real" "time" in the first place. It is certainly a technologically driven term with philosophical challenges. My artistic fascination with the implementation of synaesthetic algorithms has steadily migrated to a fascination with the intersubjective experience of human-machine-human interaction in distributed, creative environments. I believe there is a reluctant acceptance of theoretical research within the R&D lab positioned towards rapid prototyping. Art and science collaboration is a much discussed topic, but I would love to see philosophy thrown into the mix in a very practical, everyday sense. KeyWorx, like any other software generated in an arts context, has an aesthetic character. Much of the work that I've witnessed from artist performances has a montage quality in which the individual contributions become indiscernible in the cooperative product. I have also seen people design multi-user games, theatrically situate public-space surveillance cameras, broadcast local soundscapes from walkie-talkies, and project collective protest messages onto buildings during the recent Republican National Convention in New York. Aesthetic is as aesthetic does In my view, role of KeyWorx as a tool is best expressed by Felix Guattari when he argues that we are autopoietic machines that self-produce worlds in the ethico-aesthetic paradigm and must take responsibility for the creative instance that produces the created things.

That collaborative efforts cannot be generalised about and are subject to the chemistry of personality, the whims of mood, the weather and the price of milk is pretty

much agreed. Sustained collaboration builds upon a fragile foundation and formulates degrees of trust, weighted probabilities, and shared outcomes. The intersubjective dynamic, deep convictions and anarchistic attitude of the original KeyWorx team are embedded in the behaviors, style, function/dysfunction, language and philosophy of the technology.

For example, there was an early conscious decision NOT to implement a moderator/director function in the application, requiring players in each KeyStroke/KeyWorx session to negotiate or abandon hierarchical structures. There is more than vision, code and design here. There is a mini-culture, at once elastic, cryptic, resilient, stubborn, impatient, impulsive, cautious and enthusiastic. If there is a truly bottom-up, processual aesthetic to be identified with the technology – the distributed working-alone-together of the participating artists – it is built upon the dynamic articulation of cooperative strategies from which the creative may emerge.

Additional KeyWorx Functionality

Two important functions were augmented in the application in 2003 - the Google imagecrawler⁷³ module and the SMS module. Within the structure and organization of the application as a system, they are hyperautonomous affects. “They are autonomous not through closure but through a singular openness. As unbounded “regions” in an equally unbounded field, they are in contact with the whole universe of affective potential, as by action at a distance” (Massumi, 2002a, 43). The imagecrawler, a simple bot filter in KeyWorx, opens the Google database of images to players during a jam. By instantiating the crawler and typing in a word or URL, the images are displayed in the performance at the (speed, size, screen position, etc.) discretion of the players. Though not a random function, as Google’s database is hierarchical based on popularity, there is a random feel about it, an unpredictability. It is semiotically variant due to the whims and fancies of categorisation and image titling. In itself it mimics Bergson’s centre of indetermination, selecting usable images from the universal flux of images. As these images, upon entry into the playing field, can be modified by other processing operations, it also mimics Hansen’s digital upgrade of Bergson’s image selection through the filtering and creating of new images.

The inclusion of an SMS text messaging module enabled local and nonlocal spectators to contribute text images to the performance, further opening (structural coupling) the autopoietic recursivity of the KeyWorx system to communications sys-

tems outside the Internet. The structural architecture of KeyWorx is extensible. Its organisation is affective and expressive, simultaneously bringing the outside in and the inside out. As a structure, KeyWorx could be described as topological with an ontogenetic and autopoietic organization. An abstract machine (see Chapter Six). Both of these functions played an important role in the *Interfacing Realities* performance examined in the next Hinge.

Current information on KeyWorx R&D is available on the KeyWorx Open Source development website⁷⁴.

NB: The engine in KeyWorx that renders all the media formats in real time is called the "Realizer." It is a separate component in what was a three-part architecture - Server, Patcher, Realizer - from 1998 to 2004.⁷⁵ The original Realizer had a separate output window that displayed the composited performance. The name of this engine was christened by programmer/developer Tom Demeyer. Were we naming the components within an abstract machine ontology, we would better call this engine - The Actualiser. The common misconstrual in new media discourse and software engineering, is considering the virtual to be a simulation of reality. Hence, Demeyer's Realizer makes "real" all "possible" algorithmic re-presentations. As we will continue stressing, the power of the virtual is its realness. Within the affective interplay of a KeyWorx event, the real/virtual is actualised, in one or many dimensions, in the composited real time artefact of the audio-visual output.

Distinctions between possibility and potential, real and actual will be discussed in the following chapter.

Part Two - Creative Processes: Mind the Gap

Introduction

Theories of creative processes are as many and varied as perspectives on emergence. A selection of modes, methods and projections of the creative event will be addressed here as a means of conjuring descriptions of performativity. Deleuze and Guattari divided creative, nomadic thinking into three distinct domains: philosophy, science and art. Each domain exhibits a distinct and irreducible method: concept, function and percept/affect respectively (Deleuze and Guattari, 1994). These domains diverge and intersect coextensively but never hybridise, never synthesise. These classifications are appropriate to this thesis as the research praxis is interdisciplinary. Are these distinctions valid for the genre of performance practice explored here? Do distinctive conceptual, functional and perceptual methods resonate with transversal aesthetics in technologically mediated LiveArt performance practice? Having clearly chosen a posthuman process theory, in its plurality of schemas, as the peg to hang assertions on, the limits placed by Deleuze and Guattari on methods of discovery tax certain aspects of that affiliation.

Alternatively, the demarcation between philosophical, scientific and artistic methods may be steadily blurring. Interdisciplinary projects in art and science collaborations are increasingly common. Cultural theory inculcates digitally mediated practice, on a daily basis, through popular lists and websites (nettime, c-theory, spectre, empyre, idc, etc). The line between artist, engineer and theorist is often very thinly drawn in a growing number of practitioners. Deleuze & Guattari's insistence on the boundaries that demarcate the modes and methods of thought associated with philosophy, science and art is significant. Their insistence on irreducible differences in kind that bi(tri)furcate in creative thought: philosophy produces concepts (variations), science produces functions (variables) and art produces percepts/affects (varieties). There is no synthesis between them, only the co-extensive planes of Immanence, Reference and Composition, meeting in a (not-necessarily-limited-to-human) brain. "The brain is the junction - not the unity - of the three planes." (Deleuze and Guattari, 1994, 208).

For Deleuze, thought is a topological folding process in which every inside is in contact with every outside "*independent of distance* and on the limits of a 'living': and this carnal or vital topology, far from showing up in space, *frees a sense of time* that fits the past into the inside, brings about the future in the outside, and brings the two into confrontation at the limit of the living present" (Deleuze, 2000). This

notion of thought knows no boundary (intensive or extensive) and owes a large debt to Bergson's descriptions of past and future in the recognition of the lived present (1991). It evokes the strange loop topology of the actualising virtual (Varela, Delanda, Grosz). The structure of thought then, is similar to affect. It's interesting to speculate inside a Deleuze&Guattarian ontology, that thought might disengage from itself (as affect splits from affection) to conserve itself in objects, in the wind, in the past: i.e. concepts, 'memes', intuitions, affectively shared *and* produced. It is this freeing of "a sense of time" in thought and the subsequent deprioritising of distance that screams its relevance when "performativity" is situated in a translocal fold. Thought and affect polyrhythmically piggyback on a transversal topological virtual/actual loop.

The triangulated concept, function, percept/affect distinctions of Deleuze and Guattari are set out in this chapter and the next within the broader framework of emergence and autopoiesis unravelled in the previous chapters. Included are citations and opinions from prominent specialists whose research interferes with the movements of Deleuze and Guattari's distinctions: Belgian physicist Ilya Prigogine for example, determined to close the gap between physics and metaphysics by insisting that science could indeed understand Time, as philosophers have long sought to do, despite Einstein's doubts that science could ever objectify the 'now'. Biologist Francisco Varela (1992,1993, 1999) crossed that line as he dipped into the resources of eastern philosophy for models of time, structure and cognition. Countless examples might be taken into account of physical, scientific functions with an empirical, metaphysical complement and likewise, of a metaphysics derived from the abstractions of mathematical theorems made functional and pragmatic.

Chapter Four presents three examples from contemporary neuroscience that explore the half-second interval that translates as Bergson's "zone of indeterminacy". The interval establishes a basis for probing the question of how composition is composed from a confluence of vectors, ontological (ontogenetic), epistemological and artistic. The *time* of this interval is relevant as the measure of the delay between action and reaction is the passage to intuition. The preferred method for investigating these paradoxical distinctions is Bergson's *Intuition*, generated from an adamantly real, empirical metaphysics. Simondon's concept of *transduction* as a thought process reinvigorates Bergson's (and Deleuze's) method in the contemporary terminology of the event and event-based structures or systems. In thinking the *relational event*, specific differentiations emerge between science, philosophy and art. Are Deleuze and Guattari's final and conclusive differentiations viable generalisations?

Chapter Three

The Philosophical Concept: Intuitive Practice

The concept is an incorporeal, even though it is incarnated or effectuated in bodies. But, in fact, it is not mixed up with the state of affairs in which it is effectuated. It does not have spatiotemporal coordinates, only intensive ordinates. It has no energy, only intensity [...] The concept speaks the event, not the essence of the thing – pure Event, a haecceity, an entity. (21) A concept is therefore a chaoid state par excellence; it refers back to a chaos rendered consistent, become Thought, mental chaosmos. (Deleuze and Guattari, 1994, 208)

What is Intuition?

For Bergson, intuition comes in two flavors: intuition as participation in the immediacy of experience and intuition as a precise philosophical method. Intuition is not a concept but the movement of thought that reveals absolute reality – time. Common sense understandings of intuition render it as a feeling or a hunch or an inspiration. For Bergson, it is closer to a reflection that grasps the variability, motion and changing nature of continuous time. This is the time of duration, a qualitative multiplicity that is not a linear succession of moments or events of being, but a direct perception of the flow of reality, of real time, *la durée*. It is not the thought mode of the intellect. It can't be measured in chronological units. There is an implicit paradox in it as it is both simple and complex. Deleuze explains that "Bergson often presents intuition as a simple act. But in his view, simplicity does not exclude a qualitative and virtual multiplicity, various directions in which it comes to be actualized. It is in this sense then that intuition involves a plurality of meanings and irreducible aspects" (1991, 14). It participates in the Event. It could be regarded as a *recognition*⁷⁶ of bifurcating dimensions, of divisions, of infinite contingencies⁷⁷, of variable truths, of a fluid ethics, of emergent patterning.

Improvisational and/or compositional practice in the arts and specifically the performing arts, implicates intuitive practice. Creative play indulges intuition, spontaneity and an active engagement with the surrounding environment. Observing audiences experience this in jazz, stand-up comedy, improvisational theater and dance, interactive installations and participatory performance structures. It's fair to say it's also prevalent in playgrounds, in online gaming, in team sports, as well as in the creative efforts of painters and poets, stockbrokers and surgeons, butchers and bakers. Like Fox-Keller's instinctive slime mould, intuition, as the recognition of other durations, can collectively individuate in the event; the one in the many, the many in the one. In a connected event, intuition in its topological self-variation,

loops back on itself through processes that actualise the virtual *and* virtualise the actual, reciprocally. Intuition transductively intersects other durations, other virtual multiplicities. In the style of *la durée* composition it is felt thought, thought-sensation that actualises the virtual dimensions it moves through.⁷⁸ The movement of intuition's self-variation (the in-itself of difference, the plurality of meaning) in performance practice is expressed even as it is distributed between the performers. In collaborative translocal composition, these multiple 'input' virtualities are 'output' as part subject, part object actualisations and feedback as input representations that output as virtual affect. This is not a black box analogy, but rather a topological intensity. Intuition is an analogue sensation of transformation that is re-doubled by this transversal emergence. HeteroDTE. The changing dynamics of change.

Concept 1: *The interplay of creative thought in the relational event dimension of translocal, polyrhythmic composition is intuitive. The aesthetics are transversally emergent.*

Distinguishing Virtualities

In everyday usage, the virtual is understood to be the opposite, or binary, of the physically real. In computer parlance, 'virtual' is something that is not real but comparable to it, a simulation, a representation of reality, an algorithmic or digital process which simulates something real but is not in itself real. This rendering of the *virtual* is entirely counter-productive to any discourse that probes process, movement and time.⁷⁹

The *virtual*, as described by Bergson and those who have elaborated on his thought, opposes this conventional meaning. *Virtual* in our context, is real, but not yet actualized. Abstract, yet real. "Never present in position, only ever in passing" (Masumi, 2002a, 5). It is temporally qualified rather than spatially quantified. An analogue continuity. Entering the discussion of media technologies, the interpretations of the terms are easily confused. The *virtual* will always be considered in this thesis in its Bergsonian/Deleuzian colour, unless otherwise stated. But this philosophical rendering of the virtual is further complicated by an important differentiation between Bergson's meaning and Deleuze's reworking of it. For Bergson, the virtual is embodied, actualised from its own resources, resonant within the space of the body. For Deleuze it is the plane of immanence⁸⁰ and the Body without Organs (BwO) and the abstract machine. The virtual is not embodied/embedded, but rather a surface-like skin. Massumi positions what could be called 'effective virtuality' in much the same way as effective complexity was pragmatically positioned:

Concepts of the virtual in itself are important only to the extent to which they contribute to a pragmatic understanding of emergence, to the extent which they enable triggerings of change (induce the new). It is the edge of virtual, where it leaks into the actual that counts. For that seeping edge is where potential, actually, is found. (Massumi, 2002a, 43)

That edge of the virtual/actual, the qualitative/quantitative, can be literally described by a topological figure, of which a möbius strip exemplifies the edgeless continuity that moves between the two multiplicities⁸¹. Recent theory has seen a nuanced refocusing of Deleuzian virtuality (Massumi; Hansen) in rethinking affective potential. This project uses the translocal event to explore that affective potential of the virtual/actual intensive living body and its outside. This *virtual* will migrate, synonymously, to the *incorporeal*, a term that also substitutes for Bergson's "zone of indeterminacy," an in-corporeal centre of action. Massumi defends a paradoxical distinction:

The charge of indeterminacy carried by a body is inseparable from it. It strictly coincides with it, to the extent that the body is in passage or in process (to the extent that it is dynamic and alive). But the charge is not itself corporeal. Far from regaining a concreteness, to think the body in movement thus means accepting the paradox that there is an incorporeal dimension *of the body*. Of it, but not it. Real, material but incorporeal. Inseparable, coincident, but disjunct. (2002, 5)

The term 'incorporeal materialism,' coined by Foucault in the *Archeology of Knowledge*, is used to articulate the virtual or "the felt reality of relation" (Massumi, 2002a, 16). Affect (Massumi). Internal resonance (Simondon). The plane of immanence (Deleuze and Guattari) or the centre of indetermination (Bergson). Whether incorporeal, or quasi-corporeal⁸², intuition, for all teams, is movement through the durational, virtual potential of the event. It is not of the mind, not the Cartesian cogito. Yet it "inhabits" the cognitive gap, the virtual delay space between braintime and action, where the conditions of intuition (immediate data of consciousness) and its becomings might be discovered. Ultimately, an analysis of translocal composition, situated in a vibrant, multi-modal virtual ecology, will tackle the conundrum of the gap. Performance practice is an art form perfectly suited to this task. As Guattari emphatically puts it:

An ecology of the virtual is thus just as pressing as ecologies of the visible world. And in this regard, poetry, music, the plastic arts, cinema – *particularly in their performance or performative modalities* – have an important role to play with their specific contribution as a paradigm of reference in new social and analytic practices... (1995, 91 emphasis added)

The performance of multi-maker composition created by interdisciplinary assemblages of artists using the matter of video, graphics, sound, language, movement and code, taps Bergson's imagining of real time (*la durée*); that is, the experience of the movement of one's own duration, the seamless continuity of the *virtual*, and innumerable other durational dimensions through intuition. Only intuition can intersect duration. Deleuze perfectly situates intuition as a processual tool for performance:

Intuition is not itself duration but rather '*the movement by which we emerge from our own duration*' and 'make use of our own duration to affirm [...] and recognize the existence of other durations'... (1991, 38 emphasis added)⁸³

This is polyrhythmic practice, the intuitive interplay between streams of durational rhythms. The chaotically organised two beats against three beats against four beats in which the event is not in any beat at all but in complex interstice that glues the rhythms. Grosz explains intuition's situatedness in duration this way:

Although it cannot be identified with duration, intuition is a movement by which thought emerges from and recognizes its own relation to duration and thus the relations of difference and entwinement it has with other durations. Duration is the reality in which intuition finds itself... (2004, 235)

At issue is the movement of intuitive thought as felt thought, an emergent 'affective-intelligence'. The issue also intersects the distribution, recognition and coextensivity of "other durations" – human and nonhuman – that intuition intersects. The preceding chapters have established an expansive if complex backdrop for analysing compositional practice in terms of systems theory, relational theory, post-humanist transversality and processual aesthetics. The missing link in this labyrinth is the relation between the qualitative temporality through which intuition moves and the quantitative spatiality of the body it passes through as affect. This analysis requires ontogenetic respecifications of the analogue and the digital with regard to connected composition. Time must be distinguished from space to evalu-

ate the *conditions* of the spatiotemporal. To grasp how accessing the indivisibly-multiple temporal, through intuition, is experienced in the space (or 'spacing' as Hansen would have it) of the body. To gauge how intuition as a mode of creative thought is realised in composition, particularly interauthored, composition that has indeterminate qualities (with respect to indeterminacy as defined in performing arts practice).

Concept 2: Affect, through a process of individuation, is transductively distributed in translocal, polyrhythmic composition. The 'space' of affectivity must be quasi-corporeal, indeterminate and proprioceptive; internally resonate, externally vibrant

The Intuitive In-between

The experience of intuition is not the familiar "aha" moment of inspiration because it is not a moment at all, not in time but *of* time. It intersects with duration, is *of* duration. Intuition has two tendencies - movement and method, but it is itself a middle relation. Bergson distinguishes between two modes of thought that are different in kind - instinct and intellect. Intuition is the movement between them. It is a dynamic in-between, a recursive return that "has become disinterested, self-conscious, capable of reflecting upon its object and of enlarging it indefinitely". (Bergson, 1911, 176). Intuition intersects the qualitative, virtual 'livingness' of duration. It is a flow of interplay, difficult to achieve and sustain but worth the wait.

Intellect quantifies, spatialises, subtracts and establishes the representations necessary for negotiating life. Elizabeth Grosz and Giovanna Borradori have each pointed out the importance of intuitions' in-betweenness:

Although they are two contrary movements, one (intelligence) directed outward, the other (instinct), directed inward, Bergson seeks a way of returning each to the other, or rather of finding some principle between the two, which derives from intelligence its capacity for abstraction and generalization, and from instinct its sympathetic apprehension of and openness to life. (234) {...] Intuition is not an exploration of the unknown (this is the task of the intellect, to render the unknown known or knowable), but a finding of oneself in the unknown, an immersion in its specificity, a negotiation with its newness... (Grosz, 2004, 241)⁸⁴

But there is a second feature of Bergsonian intuition that Deleuze wants to

underline: intuition as a return (retour). A return to what? To the predis-cursive dimension of thinking that Bergson calls duration. Hence, Deleuze continues, Bergson's metaphysics does not contain "the slightest distinction between two worlds, a sensible and an intelligible, but only the distinction between two movements, or better, two directions of the same movement". (Borrodori, 2001)

So, intuition is an ontological relation between instinct and intellect that is their simultaneous movement in different directions. In many respects, as Grosz has said, "Intuition is the evolutionary heir of instinct, its refinement through its intermingling with intelligence" (2004, 236). But it's vital, in keeping with Bergson's anti-dialectical methods, not to hybridise or synthesise it. It can be treated as an expansion of perception, a Jamesian "stream of consciousness". Bergson's method has overlapping qualities with James' method of radical empiricism: "The *relations* that connect experiences must themselves be experienced relations, and any kind of relation must be accounted as "real" as anything else in the system" (James, 1996 In: Massumi, 2002a, 16). Real relationality: the relation as ontogenetic; the relation as autonomous. The metaphor of a stream is partially extensible to Bergson's *virtual*. It can easily be conceived as deeply situated, simultaneous currents from which some elements reach the surface in a continuous recycling. The allusion to the depth of the currents is problematic however when saddlebagging Deleuze's intuition to Bergson's as Deleuzian ontology is only surface, only flattened, non-hierarchical planes and the movements between them.

Imaging Images: Perception and Memory

Diagramming those flattened currents as dimensions, or other peoples' durations, would present two important modalities of temporality or "tendencies" (future-ness), as Bergson called them, or "forces" as Deleuze later labeled them.⁸⁵ The tendencies or differential relations of *perception* and *memory* form the composite of the continuum of experience but they remain heterogeneous elements on different ontological levels (or dimensions). Perception and memory - separate, different in kind, yet inseparable in experience, much like the elements of a self-referential, autopoietic system. The component tendencies of perception and memory in the composite mixture are accessible only through intuition. "[...] intuition presents itself as a method of difference or division: to divide whatever is composite into two tendencies" (Deleuze, 2004, 35-6). In this light, intuition is a bifurcating contingency; a line of flight that ripples and multiplies, looping through the virtual to the actual and back again to the virtual through the chaos of order and order of chaos.

There is then, an asymmetry between memory as a function of time and perception as a function of space. But in the experiential composite, perception spatialises time – extracts properties and causal effects of events from their own becoming and freezes them to objectify them, to intellectualise them, to position them, to measure them. Intellect as a thought mode, as a mode of discovery, as an analysis of the given. Space itself, for Deleuze, is a composite of the force of matter and the force of duration. Quantifiable space is spatiotemporal. “So, then, what is duration? Everything Bergson has to say about it comes down to this: duration is *what differs from itself*. Matter on the other hand, is what does not differ from itself; it is what repeats itself” (Deleuze, 2004, 37).

This composite of perception and memory, spatialised time and duration, lived experience, is our representation of the world. But perception, which Bergson claims puts us *into* matter, and memory, which puts us into incorporeal “matter”, cannot be represented. Deleuze pushes to “go beyond experience” to discover the conditions of experience, the differences in kind that compose life (Deleuze, 1991, 26). Intuition is a mode of thought that distinguishes perception from memory in experience. It's the “joy of difference” (Deleuze, 2004, 33). It both accesses and inhabits the reality of duration. It is not ‘the concept’, as much as it is ‘movement’ in the plane of immanence (Deleuze and Guattari, 1994, 40); the extension of the past into the *becoming* future. It is the mode of dissolution of subject/object dualism; the dissolution of constructed realities:

[...] and at once perception is seen to be radically different from recollection; the reality of things is no more constructed or reconstructed, but touched, penetrated, lived, and the problem at issue between realism and idealism, instead of giving rise to interminable metaphysical discussions, is solved, or rather, dissolved, by intuition.” (Deleuze, 1991, 69)

Perception: Bergson conceives of matter as an aggregate of images. An image is an in-between logic in which it is “a certain existence which is more than that which an idealist calls a representation, but less than what a realist calls a thing - an existence placed halfway between the “thing” and the “representation.” (Bergson, 1991, 9). The image squeezes between that Scylla and Charbydis of idealism and realism that haunts the history of philosophy. He speaks of our perception of reality in terms of these image aggregates. He asks “How is it that the same images can belong at the same time to two different systems: one in which each image varies for itself [...]; and another in which all images change [...] in the varying measure that

they reflect the eventual action of this privileged image?" (Ibid, 25). In perceiving, we subtract/select, from the universal flux of image, a neutralised representation of that image which must always stay virtual as it continues intersecting with other images. He further distinguishes the image of real action of the living body, of the individuating subject as a "privileged image", as a living centres of action around which other images "are subordinated to its position and variable with it; that conscious perception is bound to occur, and that, moreover, it is possible to understand how it arises" (Ibid, 30)

This degree of autonomy, of choice, within the privileged image of the body's action and movement, is referred to as a permeable "zone of indetermination".

Now we have considered *the living body as a kind of center* whence is reflected on the surrounding objects the action which these objects exercise upon it; [...] *It does not merely reflect action from without; it struggles, and thus absorbs some part of the action. Here is the source of affection.* (Ibid, 58 emphasis added)

Bergson alludes here to "the living body," the whole kit as it were, as the privileged image or centre of indetermination from which affection circulates intensively and extensively. This is the spatiality of quasi-corporeality, the absorption of relative imagery into an absolute cartography of change (Massumi, 2002a, 58). It presents the body as the in-itself of the interval.

Perception (the actual) and memory (the virtual) are individually specified; they are differences in kind, though they are actualised in the composite of lived experience (affect). They are co-existent, not integrated. Memory then is:

[...] inseparable in practice from perception, imports the past into the present, *contracts into a single moment of intuition, many moments of duration*, and thus by a twofold operation compels us, de facto, to perceive matter in ourselves, whereas we, de jure, perceive matter within matter. (Bergson, 1991, 73 emphasis added)

One can never perceive the enormity of all the simultaneous vibrations, all the polyrhythmic dimensions, of material reality. Perceptions' remit then, is to prepare actions, to discover between perception and reality the relation of the part to the whole. Perception then:

[...] must be linked to nascent or dawning action, action-in-potential. Perception is not a passive knowledge, the reception of the impress of the material images, that is sense data; rather it is the *filtering*⁸⁶ and sifting through the myriad properties of objects to find those qualities that interest life [...] My body serves to filter, simplify, highlight, or outline those qualities of the object that may be of relevance or use. (Grosz, 2004, 165 emphasis added)

The virtual (memory) and the actual (perception) are both intensive and extensive. Memory is the interrelation of the aggregate of images AND the body's (as privileged image) affectivity. It is the skin⁸⁷ (Murphie, 2005), the surface of the body as the in-between porous (non)boundary to the virtual/actual, inside/outside. Perception is the action of the body that subtracts, and represents, the relevant images from the universal flux of images; facilitates the effective complexity of the living organism. The role perception plays in experience is extensive and quantitative. It is capable of precisely defining things. It involves an experience with, a relation to, objects in the world.

In the composite *experience* of a present moment, perception is *of* memory – it perceives an immediate past and provokes an immediate future. It is *sensation*, complex and resonant, that is virtual; continuous and self-referential; autopoietic. Sensation is intensity - "the immediacy of self-relation" (Massumi, 2002a, 14), the experience of movement. And yet, it is *real* action. "Sensation is a state in which action, perception, and thought are so intensely, *performatively* mixed that their in-mixing falls out of itself" (Ibid, 97-8 emphasis added). Bergson relates the interplay of perception, memory and sensation to the experience of time:

The psychical state then, that I call "my present," must be both a perception of the immediate past and a determination of the immediate future [...] My present then is both sensation and movement; since my present forms an undivided whole [...] Whence I conclude that my present consists in a joint system of sensations and movements. My present is, in its essence, sensorimotor. (1991, 138)

The proportional relations of perception, sensation and action might look like this:

Perception : Space :: Action : Time

Sensation : Action (body) :: Perception : Action (world)

Past : Sensation :: Future : Action/Movement

Past + Future = Sensorimotor Present = Movement + Sensation

Memory: In brief, memory is virtually situated in Bergson's schema as a heterogeneous, qualitative continuity. It can be minimally presented by two distinctions: *habit-memory* and *memory proper* or *recollection*. Habit-memory is largely autonomic, patterned behaviour acquired from repetitive, synthesised action that is triggered in a contracted impulse. It is living memory, oriented towards future action, acting out a past through muscular motor mechanisms. It is nonrepresentational (Bergson, 1991, 82). It tends towards action and adaptation. Memory proper on the other hand, spontaneously represents specific images and is past oriented, requiring attentiveness (a turning away from the present) to access. And significantly, "it is only because there is a delay or a rift between perception and its future motor action that this orientation to and relevance of the past is possible" (Grosz, 2004, 170). This is an important aspect examined in the next chapter.

Bergson implies that this gap between perception and action, a latency quantified by science decades after his death, itself a habit-memory effect, is the space of the memory-image. At stake in contemporary theorising of technicity, especially in the media arts, is situating the digital image as memory, as haptic and as representation. The mutability of the digital image and its sensorimotor equivalencies may be altering the memory-image in an evolutionary process inclusive of the "natural drift" (Maturana, Varela) of self-organisation. Less dramatically, it asserts a rethink of the 'interval' with a revived sensorimotor, Bergsonist bias, recycling an understanding of virtuality in the bigger picture. The perception/memory difference in kind - **Perception : Actual :: Memory : Virtual** - has its logical analogue/digital corollary: **Digital : Actual : Space :: Analogue : Virtual : Time**.

Affective Movement: Position Emerges from Passage

For Bergson, *movement* has a primacy over a coordinate point in space. Passage and position are distinctive ontologies experienced as a whole. This paradoxical distinction is evoked by Zeno's proverbial arrow. For Zeno, an arrow's trajectory towards a target must pass through an infinite number of points in space. But between each point in a line of a trajectory there are an infinite number of points. Logically, it would mean that the arrow could never pass the imaginary first point for it would be gobbled up in the infinity of space between it and the second point. The whole concept of continuous and discrete multiplicities, non-metric and metric time, is addressed in this problem which has been "solved" with a variety of theorems since circa 535 BC, including Einstein's theory of special relativity. Bergson's

conclusion is that “the philosopher who reasons upon the inner nature of movement is bound to restore it to the mobility which is its essence, and this is what Zeno omits to do” (1991, 191). For Bergson, Zeno’s conclusion confuses the path or the divisible map of the trajectory with indivisible movement.

The in-between positions are logical targets: possible endpoints. The flight of the arrow is not immobilized as Zeno would have it. *We stop it in thought when we construe its movement to be divisible into positions.* Bergson’s idea is that space itself is a retrospective construct of this kind. (Massumi, 2002a, 6 emphasis added)

Multi-dimensional, multi-durational reality is a confluence of dividing and intersecting planes moving in variable directions at variable speeds. This then is the essence of the virtual/actual, duration/position split between the qualitative and the quantitative. A thing becomes a thing when we stop it in thought. Position is back-propagated, back-formed from that point. It cannot be indexed to anything outside of itself, an abstract object in movement, “pertaining to the transitional immediacy of a real relation - that of a body to its own indeterminacy” (Massumi, 2002a, 5). This brings intuition, which moves through duration, back to the centre of indeterminacy, the body itself, in relation to its movement. In that immanent sensorimotor interval of the body that is indeterminate potential. Hansen has observed that there is an “intuition of the body” (2004, 177) that emerges from affectivity through the movement of the body. This is something he calls the “proprioceptive interval” which is central to his affirmation of Bergson’s original thesis.

As we have seen it is Bergson himself who postulates the existence of such a sensorimotor space within the body. As he sees it, affection is itself a kind of action distinct from perception: “real” rather than “virtual” action. Thus, far from simply occupying the interval constitutive of perception, affection must be said to *emerge on the basis of another interval altogether*: the distance internal to the body as a form. This understanding yields a view of the body as an active, self-organizing (autopoietic) kernel possessing a virtuality proper to it. (Hansen, 2004, 224)

Massumi and Hansen are intent, in differing ways, on individuating and/or embodying affect and proprioception, in a twostep deviation from Deleuze’s relegation of affection to a submodality of perception. This is more than splitting hairs. It is arguably, a generational shift reflective of the maturing experience of digital, processual art that imposes an integral awareness of the body as a centre of inde-

termination. This move requires tweaking Bergson's primacy of passage by foregrounding proprioception. Massumi applies Bergson's qualitative and quantitative multiplicities to non-Euclidean and Euclidean space respectively. Of proprioception he says:

It is a qualitative space of variation referenced only to its own movement running on autopilot. It is not a space of measure. To get a static, measurable, accurately positioned, visual form, you have to stop this movement. This capsizes the relationship between movement and position. Now position arises out of movement. (2002a, 183)

Massumi creates a hinge-dimension, a synaesthetic topological form that folds experience between the qualitative and quantitative space. *One can stop movement in thought but thought itself keeps moving*; lived experience, in multiple dimensions, folds in on itself. The autopoietic kernel described by Hansen is an autonomous affect, a double-sided virtual (qualitative) participating in the actual (quantitative) even as the actual participates in the virtual. "Affect is this two-sidedness as seen from the side of the actual thing, as couched in its perceptions and cognitions. Affect is the virtual as a point of view..." (Massumi, 2002a, 35). Massumi further describes affect as potentially transformative sensory interactions that are:

[...] virtual synesthetic perspectives anchored in (functionally limited by) the actually existing, particular things that embody them [...] Actually existing, structured things live in and through that which escapes them. Their autonomy is the autonomy of affect. (Ibid)

This is the old second order cybernetic "closed" autopoietic system made "open" *and* distributed. It is the plane of immanence as an exponential network. Bergson's affection, exploding in its excess, distributed as the autonomised smartdust of lifestuff. The transductive power of intuition, globally mobile in a digital age, potentialises this line of flight. Bergson's embodied affection intersects Deleuze's cut-loose affect. Hansen acknowledges Massumi's navigation though affect's re-territorialisation:

Threading a path between Bergson's and Deleuze's respective conceptions of affection, Massumi's position combines the processural, virtual dimension of the Deleuzian time-image with Bergson's insistence that affection demarcates the potentiality of the body. (2004, 227)

An intuitive body emerges from the “affectivity” of its own movement. Intuition is a mode of transit through variegated distinctions between perception, memory, action, sensation, affection, the analogue and the digital. In distinguishing the intuitive from the intellectual, Bergson made a case for the co-extensivity of creative philosophical thought and scientific thought (Bergson, 1946; 1992). This theme is further taken up by Deleuze and Guattari in their last collaboration *What Is Philosophy?* Early in his career, Deleuze identified the inability to think beyond experience to the *conditions* of experience as problematic problematising. He suggested Bergson’s personal methodology as a tool for identifying questions and negotiating problems, referring to Intuition as a philosophical method. In *Bergsonism*, he describes this methodology in detail and contributes to it.

Intuition as Method

Intuition as a philosophical method has properties that are distinct from intuition as the immediacy of consciousness. It has analytical sympathies and, as a method, it strongly opposes dialectical formulations. Intuition offers an alternative to synthetic composites. For Bergson, the dialectical method poses “false” problems predicated on a double negative. Something is what the other is not. For example, there is more “substance” in *disorder* than in *order* because disorder is order minus something. For Bergson, the oppositional factors of the dialectic are the source of badly posed problems. Thinking the “what” and the “how many,” without recourse to negatives, marks a critical difference in the way one poses problems; rides the rhythm of a positive ontology. Intuition as a method of division has three main criteria (Deleuze, 1991, 14-31):⁸⁸

1. ***Problematising*** - critiquing false problems; inventing genuine ones
2. ***Differentiating*** - carvings out and intersections
3. ***Temporalising*** - thinking in terms of duration

This, for Bergson and the young Deleuze is a method for thinking philosophically. They urge avoiding a fixation on problems that only differ in degree, by a *more* or *less*. Think beyond the dialectic, beyond the dualism, to the multiplicity. Problems can be approached by division, differentiation and convergence, the splice and the intersect. Divide, multiply, intersect, converge. The new composite will hold new problems. Differentiate again. 1) Problematising and 2) differentiating are the praxis of the concrete. And 3) temporalising? How to think duration? How to intersect its polyrhythmic events?

Duration is the very condition of (the spatial characteristic of) simultaneity, as well as succession. An event occurs only once: it has its own characteristics which will never occur again, even in repetition. But it occurs alongside, simultaneous with, many other events, whose rhythms are also specific and unique. Duration is thus the milieu of qualitative difference, and each difference it proliferates is different in kind, unique in itself. (Grosz, 2004, 183)

Polyrhythms - autonomous rhythms and pulsings that converge and divide in the dance of duration. How might one grasp what differs from itself when it is enfold-ing that difference? In *The Creative Mind*, Bergson posits we do this by entering into the thing perceived. He has called this intuition “sympathy”⁸⁹ (1992, 160). When one sympathises with oneself one installs oneself within duration and then feels a “certain well defined tension, whose very determinateness seems like a choice between an infinity of possible durations” (1992, 185). This empathic approach to understanding matter overlaps with intersubjective (Thompson, 2001) theory in signalling, again, that middle region between naïve idealism and naïve realism.

The Intuitive/Transductive Event

Concept 3: *Intuition is transductively individuated in translocal, polyrhythmic, la durée composition. Variations of intuitive elements – problematising, differentiating and temporalising are intuitively (recursively, autopoietically) immanent to la durée composition (jamming).*

The most elegant approach to thinking through Intuition as a creative method is to link it to current theories of event-based structures. Here, problematising, differentiating and temporalising coalesce. Intuiting, the *doing* of intuition, can be translated as a process or operation of transduction with the surplus feature of the sensation of change (emerging relations)⁹⁰. *Transduction* is another way of approaching Intuition as a method and a processual operation. Approach the movement of Intuition’s intersection with multiple ‘other’ durations from the perspective of diverse realities, and one bumps directly into Gilbert Simondon’s notion of transduction which, as he states, “is not only a path taken by the mind, *it is also an intuition* since it allows a structure to appear in a domain of problematics yielding a solution to the problems at hand” (1992, 314). Keith Ansell Pearson has recognised the intuitive/transductive role of problematising in Simondon:

Simondon was convinced that ‘all processes of invention’, whether in the

domain of biology or that of epistemology, 'can be understood as transductive' [...] since what is of primary importance in invention is the discovery of the dimensions according to which a problematic can be defined' (1997, 184)

The inventive discovery of dimensions, the recognition of other emerging durations can only be accomplished in the temporal continuity of intuition. Simondon has taken the method by which we problematise, differentiate and temporalise a step beyond Bergson's concept and defined its elements within the ontogenetic process of individuation. Individuation situates the quasi-corporeal system in the preindividual and *becoming* in multiple processes and dimensions of individuation of which:

[...] the sole principle by which we can be guided is *that of the conservation of being through becoming*. This conservation is effected by means of the exchanges made between structure and process, proceeding by quantum leaps through a series of successive equilibria. In order to grasp firmly the nature of individuation, we must consider the being not as substance, or matter, or form, but as a tautly extended and supersaturated system, which exists at a higher level than the unit itself. (Simondon, 1992, 301)

Simondon's approach to transductive individuation is useful for describing the experience of translocal, multi-maker composition. Transduction, as a processual framework bootstrapped to Bergson's intuition, best describes the *expression* of improvisatory, polyrhythmic composing. Problematising, differentiating and temporalising coalesce in collective individuation through these processes. Because its perspective provides an interface between the technical and the non-technical, human and the nonhuman (posthuman), individuation via transduction offers a clarifying vernacular for further explication of intuitive thought with respect to creative practice in the new media arts - a highly technocratic genre.

Transduction⁹¹ is familiar through everyday transformations of one form of energy into another, for example microphones that transduce sound waves into electrical impulses that are transduced again from electrical energy to sound waves through speaker cones, even as the hair cells of the ear transduce those sound waves so that the full impact of a politician's posturing can be appreciated. Currency is another form of transductive energy. Contextually framed, transduction exposes the dynamic interface between realities. Intervallic potential can as well be called a transductive individuation, a becoming "out of a domain of unresolved tensions and potentials" (Mackenzie, 2002, 17). Individuations are out-of phase ontogenetic proc-

esses. They are partial resolutions, metastabilities, occurring through an interior processing, through an affectivity that Simondon calls *internal resonance*:

The living individual is a system of individuation, an individuating system and also a system that individuates itself. The internal resonance and the translation of its relation to itself into information are all contained in the living being's system [...] In the domain of the living being, [internal resonance] becomes the criterion of any individual qua individual. It exists in the system of the individual and not only in that which is formed by the individual vis-à-vis its milieu. (1992, 305)

This is the recursive instantiation of self-making, of autopoiesis that is for Simondon – the nonlived domain of the *preindividual*, contemporaneous with the organic individual, through the ontogenesis of individuation. Hansen explains: “While perception draws on already constituted organic structures, affectivity mediates between the constituted (organic) individual and the preindividual milieu to which this being is structurally coupled” (2004, 266). This notion is also redolent with Guattari's *ecosophy*, which is inclusive of structural coupling in multiple dimensions or “zones” as Simondon would have it:

This term [transduction] denotes a process - be it physical, biological, mental or social - in which an activity gradually sets itself in motion, propagating within a given area, through a structuration of the different zones of the area over which it operates. Each region of the structure that is constituted in this way then, serves to constitute the next one to such an extent that any time this structuration is effected there is a progressive modification taking place in tandem with it [...] The transductive process is thus an individuation in progress. (1992, 313)

Transduction is a relay. Relevant to the discussion here, it is a mode of thought, something Simondon describes as a “psychic problematic”. Contextualised as a method, such as Bergson and Deleuze posit Intuition, one of many ways that transduction is actualised is through the *diagrammatic* contours of conceptual space in which diverse realities are connected, coupled and erased.

What is interesting is that the diagram participates in a geneology of figures that moves from the wax tablet to the computer screen. From a phenomenological vantage point, the Greek setting of diagram suggests that *any figure that is drawn is accompanied by a expectancy that it will be redrawn* [...] Here

a diagram may be thought of as a relay. While a diagram may have been used visually to reinforce an idea one moment, the next it may provide a means of seeing something never seen before. (Knoespel, 2001, 147 emphasis added)

The diagram functions as a transductive relay. Chapter Six will elaborate on the diagram's categorical relevance to compositional processes. As a thought mechanic, it slips in the through the back door of neurological approaches to the cognitive interval.

Chapter Four

The Scientific Function: Mind the Gap

The object of science is not concepts but rather functions that are presented as propositions in discursive systems. (Deleuze and Guattari, 1994, 117)

Varela's Microidentity Breakdowns

Francesco Varela was an interdisciplinary hybrid, a biologist, philosopher, neuroscientist, Buddhist, who wore all these hats in his lifelong research on embodied enaction. His research represents a hinged middle between a modified phenomenology of Merleau-Ponty, the pragmatism of Dewey and James and a specific attunement to Deleuze and Guattari. Taking a cue from John Dewey's distinction between "know-what" and "know-how",⁹² Varela describes the conditions of what he calls *microidentities* through a *readiness-for-action* principle which is a transparent, autonomic, habitual doing. *Microworlds* are the lived situations of these microidentities. The self or subject, from Varela's perspective, is co-dependent on its lived, enacted situation. Microidentities and microworlds are historically constituted; constantly transiting from one to another as readiness-for-action shifts situationally. These transitions between microidentities are "breakdown points" and they are constituted of commonsensical emergent properties:

In fact, the key to autonomy is that a living system finds its way into the next moment by acting appropriately out of its own resources. And it is the breakdowns, the *hinges* that articulate microworlds, that are the source of the *autonomous and creative side of living cognition*. Such common sense then needs to be examined on a microscale, for it is during breakdowns that the *concrete* is born. (Varela, 1992b, 10-11 emphasis added)

Creativity is in the breakdown; in the micro-catastrophes that shift between microworlds. The "concrete" is the ontogenesis of event potential, the movement of transformation. It is in the immediate coping with continuous experience during breakdowns that cognition does its hardest, most creative work. Not in deliberation and rational analyses. This bears some familiarity with Bergson's distinction between intuition and intellect, and with Simondon's transductive individuations, with one additional facet – the movement of intuitive process in duration is felt thought while the breakdown event is inaccessible to experience. "It follows that such a cradle of autonomous action is forever lost to lived experience since, by definition, we

can only inhabit a microidentity when it is present, not when it is in gestation” (1992b, 334). This is the paradoxical distinction that impinges on autopoietic self-referentiality and the observation of observation that is the centrepiece of Luhmann’s contiguous second order cybernetics project. Recalling Luhmann’s thesis that the cognitive operation, as it emerges simultaneously with the world, is unknowable, unobservable due to the *blind spot* (1990, 76). Here, Varela and Luhmann remain in agreement regarding the integral role of the observation of observation, of the role of other in the production of reality. Varela assigns three phase-locked time scales from which neuronal ensembles emerge. These scales are the 1/10, the 1, and the 10 scale (micro, meso and macro):

We have neuronal level constitutive events that have a duration on the 1/10 scale, forming aggregates that manifest as incomprehensible but complete cognitive acts on a 1 scale. This completion time is dynamically dependent on a number of dispersed assemblies and not on a fixed integration period; in other words it is the basis of the origin of duration without an external or internally ticking clock. (1997, 275)

He claims that we perceive time as discrete and non-linear through this integrated, endogenously generated scalar network. He identifies a 0.3 second “now” that he calls “the horizon of integration” and postulates that our perception of time is biologically bonded with affect, the “glue” between temporal, virtual flow and perceived event, between consciousness and sensorimotor processes. “The basic intuition that comes from this problem is that a specific CA [cell assembly] emerges through a kind of temporal *resonance* or “glue” (Ibid, 273). Here is a linkage leap between Varela’s neuroscience of the affective interval and its metaphysical cousin. These conceptual variations of lived experience (intuition, transduction and microworld breakdowns) afford entrance to the processes of composition, of group play, of creativity production in the collaborative event-dimension. But there is another influential theory, taken up by scientists and philosophers, to add to the mix before addressing performative composition. It is the measure of what can off-handedly be called “real time” – “where the interval between the triggering of an event and its processing/reception falls beneath the threshold of sensible perception (i.e. faster than conscious thought)” (Mackenzie, 2002, 151).

Libet’s Liminal Latency

In 1965, a neuroscience team in Germany, Kornhuber and Deecke, discovered, by placing an EEG on the scalp of the frontal lobe of a volunteer, a one second buildup

of electrical activity that precedes muscle movement. They called it *Bereitschaftspotential* (BP) or the “readiness potential” (RP), the same readiness-for-action interval that Varela cites. In the 1970’s, neuroscientist Benjamin Libet discovered through experimentation with electrical impulses on the human cortex, that an external electrical stimulation requires a 500 to 550 millisecond duration to trigger a conscious experience (Libet et al, 1979). Libet’s team triggered two simultaneous sensations; one in the left hand of a subject using an electrical charge on a correlating brain region and the other, a direct sensation to the skin of the right hand. He expected a similar result, a half-second lapse between the stimulus and the triggered consciousness of the stimulation. What he found instead was that when the stimulations were experienced simultaneously in each hand, the stimulation of the cortical area was triggered a half-second earlier than the skin area. Consciousness lagged a half-second behind the cortical stimulus. Libet concluded that the conscious mind backdates the event, *as an illusion*, so the experience feels to be in temporal real time.

Libet and colleagues updated this experiment in 1983 using an EEG to include an act of choice on the part of the experimental subject. While staring at a fast moving clock with a rotating red graphic, a participant was asked to mentally record the time of her decision to move her wrist and report the equivalent position of the clock hand. The Libet team called this subjective judgement “W”, for “will”. The subjects also recorded the moment they moved their wrist and this was called “M”, for “movement”. The idea was to formulate the timing of the decision to move and the actual time of the movement. The subjects’ movements came 0.2 seconds after the decision but brain activity measured the decision as occurring 0.3 seconds before the decision was made.⁹³

The actual neural preparation to move (RP) preceded conscious awareness of the intention to move (W) by 300 to 500 milliseconds. Put simply, the brain prepared a movement before a subject consciously decided to move. This result suggests that *a person's feeling of intention may be an effect of motor preparatory activity in the brain rather than a cause*. As Libet himself indicated, this finding ran directly contrary to the classical conception of free will. (Obhi and Haggard, 2004 emphasis added)

These results have been implicated in the discourse surrounding determinism and free will; the epiphenomenal role of consciousness; reversed epiphenomenalism;⁹⁴ intentionality as a preindividual wetware dance.

In complex life forms, this delay between perceptual reaction and the consequent motor response, precipitated many of Bergson's theories on time, free will, matter and memory. He presciently described the brain as:

[...] no more than a kind of central telephonic exchange: its office is to allow communication or delay it. It adds nothing to what it receives [...] its office is limited to the transmission and division of movement [...] That is to say that the nervous system is in no sense an apparatus which may serve to fabricate, or even to prepare, representations. Its function is to receive stimulation, to provide motor apparatus, and to present the largest possible number of apparatuses to a given stimulus. The more it develops, the more numerous and distant are the points in space which it brings into relation with ever more complex motor mechanisms. (1991, 30-1)

The 0.3 second readiness potential from brain activity to conscious perception is a false start. The brain gets a jump on conscious perception. The additional ± 0.2 seconds from perception to action extends that gulf. Two gaps, each with its own ontology and its own false start: the interval of consciousness and the interval of motor action respectively. The second false start in the motor interval indicates a state of premotor anticipation:

A person's subjective judgment of when movement started came an average of 86 milliseconds before the onset of electrical activity in the muscles specific to the movement. That means that our subjective experience of the beginning of the movement must also come from some premotor process—something that takes place before the muscles themselves contract.” (Obhi and Haggard, 2004, 358)

What might inhabit the space of time in these intervals? Where might the conjecture begin? Is it perhaps the unobservable *reality* of Luhmann's blind spot? Might it be as Bergson suggests - that the more complex the life form, the longer the delay and therefore the greater number of choices and the 'freedom' to choose them (multiple contingencies)? He also suggests that the longer the delay, the greater the access to the movement of intuition. Is it then an interval of accessible excess? Contemporary neurophysiology experiments tend to oppose Bergson's speculations, discrediting a straight-forward interpretation of "intuition" as playing a role in choice (Obhi and Haggard, 2004). Neural preparations for movement occur well before conscious agency throwing the exigency of the "cause" in the cause-effect equation into doubt. Recent experiments also indicate that the somatic effect of a

voluntary action is perceived before the action whereas involuntary movements are perceived to occur after the action (Ibid). A fascinating range of data from which to speculate...

Libet surmised, in the hope of preserving some explanation for free will, that the RP establishes a *veto* to possible action (Libet, 1983). Call it an inhibitor, call it a modification, call it *Free Won't* (Obhi, Haggard, 2004). Libet-style research discussed here pertains to the temporal order of a single event. This all becomes exponentially more complicated as neuronal stimuli are not discretely successive. We don't trigger one stimulus, wait that half-second, act and then trigger another. There are multiple, most likely infinite, stimuli in any metric moment. What Libet additionally found is that one incoming stimuli can modulate another. The RP interval and the consciousness-action interval are multiplicities. Massumi describes this: "If a later stimulus can modulate an earlier one before it becomes what it will have been, the recursive durations start to meld together. Experience smudges" (2002, 196). And:

In other words, the half-second is missed not because it is empty but because it is overfull, in excess of the actually-performed action and of its ascribed meaning. Will and consciousness are subtractive. They are liminitive, derived functions that reduce a complexity too rich to be functionally expressed. (Ibid, 29)

This subtractiveness is compatible with Bergson's meta-level view of the subtraction of usable images from the universal flux of all images, that is the perception recollection composite of lived experience. It also resonates with division and differentiation as modes of intuition. Intuition becomes a means of negotiating an effective complexity, an ontological relation between order and chaos. There is a correspondence here, if the percept/affect is interjected as a mode of intuitive thought, with Deleuze and Guattari's idea that "Art struggles with chaos but it does so in order to render it sensory..." (1994, 205).

Libet's Legacy

Recent neurophysiological research based on Libet-style experiments link *lateralized readiness potential* (LRP), or the preparation of specific movement from left or right brain hemispheres to correlate right or left body parts, to the conscious experience of controlling a particular movement to achieve a particular goal. "For example, the experience that precedes turning on the light [...] might be linked to the decision about which hand to use to reach for the switch" (Obhi, Haggard, 2004).

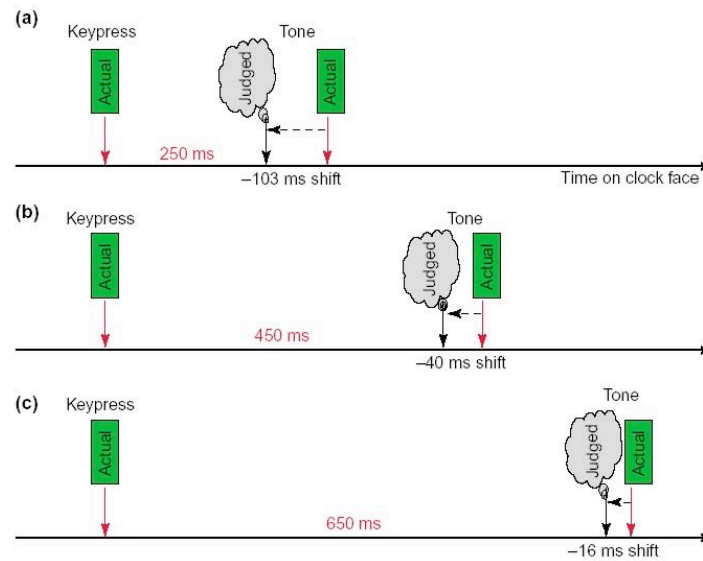


Figure 4.1: Haggard et al. report that the judged time of a tone changes as a function of the delay between the tone and a previously executed voluntary act. As the delay is lengthened (a-c), the time mis-estimation is reduced [...]. In the experiment, time judgments are always retrospective, which is why they can appear to precede the actual times of occurrence on the timelines. (Representation of Haggard et al, Table II, fixed delay condition.) (Eagleman and Holcombe, 2002)

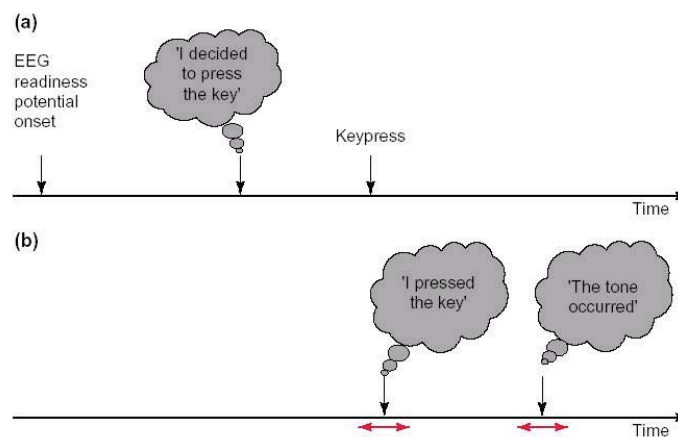


Figure 4.2: The two timelines summarize the relationship between the Haggard et al. study and influential studies in its lineage. (a) summarizes the studies of Libet and his colleagues; (b) summarizes the domain of the Haggard et al. study. Thought bubbles represent the subjects' reports; that is, when they believed an event occurred. In the experiment, these thoughts did not occur in the same real time sense as did the readiness potential and the keypress; instead, timing judgments are always made retrospectively. The horizontal red arrows represent the reported shift in timing judgments resulting from manipulation of causality in the Haggard et al. experiments. (Eagleman and Holcombe, 2002)

LRP data provides more precise indications than RP of the perception of control or the awareness of an intention to make a specific move. Haggard's team(s) have shown that the felt relation, via sensory feedback, of causally linked events, are perceived as occurring earlier in time (± 50 ms) if they are voluntarily triggered by the subject and after-the-fact if involuntarily enacted (Haggard, Clark and Kalogeras, 2002). This temporal sequence of conscious experience, from intention to the felt effect of an isolated action is exemplified in the experiment in *Figure 4.1*.

We therefore conclude that conscious representations of sensorimotor events surrounding voluntary action are bound by a specific cognitive function of the CNS [...] The binding effect is modulated by temporal contiguity and temporal predictability. These results suggest that these perceptual shifts may be a conscious aspect of a general linkage through time between representations of actions and effects. Accordingly, we refer to this function *as intentional binding*. (Ibid, emphasis added)

Four results from this study reflect the interests and aims of this thesis: (1) a voluntary action anticipates the sensation of the effect (± 86 ms) (2) consciousness appears to provide the illusion of synchronicity (metric real time) for the Libet lag (3) the longer the delay between cause and effect, the more accurate the judgement of the timing of the event (4) representational memory is linked to specific central nervous system functions as an intentional binding. Intention and anticipation affect the sensation of effect. An induced delay (250, 450, 650 ms) in the intentional binding of voluntary causation apparently increases the accurate positioning of an event in metric time. It amplifies the illusion of a back-propagated actualised event; compounds habit/haptic-memory and recollection in the process of recognition - "the progressive movement by which past and present come into contact with each other" (Bergson, 1991, 237). It lends support to a Bergsonian sensorimotor interval. Whether or not the "cause" is willful, the stretched out recursivity of affective anticipation (intentional binding) appears to enhance the perception of real time beyond the mere latency *tolerance* Libet posited.

Though this data is far from conclusive, it offers an intriguing perspective on trans-local performers, separated by continents and time zones, united in variable delays between cause and effect; players sharing a similar screen environment, an ecology of transforming media objects and the relations between them, engaged in a synchronous composing process. There is demonstrative linear causality in responsive interplay; in the requisite homeostatic flow of negative feedback that stabilises the composition. There is intuited quasi causality in the resonant intensity, the complex

provocation and flow of positive feedback that effectively destabilises that same ecology. All distributed multi-maker applications, whether shoot-em-ups or vj/dj-like compositional environments must deal with the parameters of metric and durational real time, of interpolating a 'now' through a relation between gesture and effect. That 'now' is a future-past of hardware, software and wetware delay multiplicities. In translocal interplay these relay delays can be fractional seconds or fractional minutes (e.g. a four to eight second delay is common in broadband streams, a ten to fifteen minute delay affected interaction with the Mars Rover⁹⁵).

How are these causal relationships affected by the variable illusion of metric real time? How might an intersect of an intuitive *la durée* real time with the illusion of metric real time in the RP interval be proposed? How does collective enaction on the same objects affect the sensation of change? Distributed augmented reality can be thought of as *sensational*, eclipsing perception through composited experience. The interval is then "A receding of a latency that is not just the absence of action but, intensely, a poisoning for more: an *augmentation*" (Massumi, 2002a, 98 emphasis added). The half-second sensorially augmented, readiness-for-action interval. *Figure 4.2* represents Libet's (a) and Haggard's et al (b) findings in a causal context.

Though Libet's research is not without its detractors,⁹⁶ the conclusion that the cognitive interval establishes a ± 200 ms window for free will to veto or inhibit action is a plausible one. Taking Bergson's ideas on board, it is only in duration that one can speak of the experience of freedom. For Bergson, freedom was the mobility of the temporal. Later, for Deleuze, mobility became an asset of qualitative multiplicities made spatial. Assessing the recent research of Haggard and Eagleman that gives temporal awareness of enaction an edge with latency, and pursuing the spatiotemporal attraction of linear causality and the perception of time, a paradox looms. In duration there is no causality per se, there are no juxtaposed events, there is only continuity; so causal perception is not intuitive by Bergson's standards, is not virtual. That's a match with the scientific argument maintaining it is back-propagated reality. It may be perceptually synchronous in science's functional measurement, but it is not of durational time, it is of space if referencing the premise of asymmetrical timespace. And so to repeat a warning that Deleuze interpreted in Bergson's method of Intuition cited earlier: "*Second Rule: Struggle against illusion, rediscover the true differences in kind or articulations of the real.*" If our sense of the now is an illusion (Libet), what might its differencing tendencies be? Matter and Mind? Local and Global? Perception and Memory? Qualitative and Quantitative? Contemporary neurophysiology implies an implicit temporal illusion in the cognitive gap that is further affected by causal latency. A felt relation of a processual event which may

imply the virtuality of the quasi causal. So, as a proposition, either science is measuring an immeasurable qualitative virtuality or the interval isn't virtual at all or it is both or none of the above.

The Paradox and Interplay

This issue of latency tolerance, or the lag between the instantiation of an event through a gesture (keyboard, mouse, controller, etc) and the recognition of an image or sound is crucial to multi-player, real time application design. As stressed, the very nature of *real time* is at issue in these technologies. The movement of the enacting gesture, even as an incremental tweak of the first digit of a thumb on a game controller button, is embodied (enfolded, in-formed) with the images and sounds it effects. In multi-player, real time applications, these gestures and images/sounds are also touched, anticipated and enfolded by others. It's a complex soup. The goal of real time software developers is, generally, to reduce delay in real time to 0ms. In fact, real time, as a computational concept, detemporalises time in its confluence of past and future in the sensorimotor present. "Real time attempts to collapse the intervals between an event and its reception, so that the event is structured by its processing" (Mackenzie, 2002, 168). Delay is an embodied property of the process through iterative, repetitive actions. Mackenzie has pointed out, in his analysis of multi-player game interactions that:

Embodied anticipation can 'overcome' the delay, or render it latent, so that delays in the flux of the images are not even obvious to the player. Over time and through repetition, an exterior delay is gradually remapped or integrated within an altered rhythm of movements, so that gesture runs in advance of the technologised image it should merely be responding to [...] the system that remains open cannot directly take into account the delay time of its own distribution, or of the way in which we corporeally and collectively habituate ourselves to delays involved in the system. The wavering inconstant anticipation is not susceptible to measurement, since it cannot be known in advance what depth of anticipation has been incorporated into a gesture. Correlatively, we cannot be fully conscious of or in control of the delay that haunts all our gestures, since those gestures are themselves complicated forms of anticipation and response. The system of marks which synthesizes contiguity between bodies and machines is eradically open to delay and the effects of anticipations of delay. (2002, 166-8)

Various types of delay and relay are structurally coupled with anticipatory enaction. By inference, this suggests that online gamers and webjammers are honing anticipatory skills and increasing (by *decreasing* the time of the event perception) the recognition of other people's causal events in their shared fields of play. The Haggard and Eagleman studies suggest a decreased latency in effective, proximal, linear causality, between the event of a keypress and a responsive effect. It suggests that anticipation is multivalent when causal latency is considered. Within the complexity of a distributed event/structure relationship in which gestures and their effects are multi-modal and multi-player, the experience of time and its historicity is further compounded by the 'presence' of non-players in the network (effecting the differential speeds of access). In online scenarios, the transversal convergence of machine and human duration scramble the always already delay multiplicities.

Varela has said of the readiness-for-action interval:

[...] it is direct evidence of the manner in which emotional tonality plays into the dynamics of flow. Emotional tonality is, by its very action, a major boundary and initial condition for neurodynamics. This diffuse, constitutive effect is in accord with the mechanism of action via neurotransmitters that have been known for some time to condition the modes of response at the neuronal level... (Varela, 1999, 283)

This emotional tonality of Varela is the intensity of "affect"; the oscillating movements of a bifurcating point in a physical system that "paradoxically embodies multiple and normally mutually exclusive potentials, only one of which is "selected" (Massumi, 2002a, 32-3). But the provocative possibility is that this current research gives new credence to Bergson's primacy of movement over the moving thing. Linear causality is back-formed from duration - it is not *in* it. The event or readiness potential of today's neuroscience, measured in quantified, spatialised time that may or may not have a relation to personally instantiated causal relations, in many respects supports Bergson's arguments against functional determinism a century earlier and substantiates his insistence on an intuitive differencing of time and space:

Though we generally live and act outside our own person, in space rather than in duration, and though by this means we give a handle to the law of causality, which binds the same effects to the same causes, we can nevertheless always get back into pure duration, of which the moments are internal and heterogeneous to one another, and in which a cause cannot repeat its effect since it will never repeat itself. (Bergson, 2001, 233)

Part Two: Conclusions

Question: What does intuition, transduction, perception, memory, affective time consciousness, free will, latency tolerance, have to do with the performative production of composition?

Answer: Everything.

In differentiating between the content of “consciousness” and the neurological evidence of its expression with regards to latency, there is some congruence when ‘minding the gap.’ The free will/free won’t debate is of interest if unpacked in the context of the choice-making and complex relationality in the performing arts, a sector that enacts this process in real time event dimensions; pushes the plurality envelop of ‘meaning’ and its translation in the event encounter.

If meaning is [...] an interface between at least two force fields [...] between a form of content (an order and organisation of qualities) and a form of expression (an order and organization of functions) - it stands to reason that there can be no direct causal relation between content and expression.
(Massumi, 1992, 15)

The form of content and the form of expression pass through each other, situate in the immanence of the interval. This interval is at once a zone of indeterminacy and the transducer of the past (memory-image of the re-presentational memory proper) into the future; the sensorimotor present, by-passing a ‘now’ too convoluted with memory and anticipation, with preconscious synaptic firings and postconscious reflexive latency to be anything other than a future-past. Recent research on causal latency (Haggard et al; Eagleman et al) further fuels longstanding debate on the role of consciousness. The Libet lag can ultimately, only support a theory of the autopoietic recursiveness and complex duration of discrete perception which must necessarily exponentiate (always, continually) to catastrophic relational mess (Massumi, 2002a, 196). From this infinite, virtual pool of potential perception, discrete perceptions surface and actualise. With respect to multivalent performance and the relay/delay inherent in the interaction between participating artists, improvisation in translocal composition tackles the problem head on. Immersed in issues of choice, intuitive encounter, collective-becoming, co-operative engagement, distributed affect, etc., the genre posits its own peculiar logic of compositional process and exploits all manner of in-betweenness. It is a portal to the diagrammatic.

Hinge II

Interfacing Realities: KeyWorx Artist Documentation

The synesthetic hypersurface [...] is the hinge-plane not only between senses, tenses, and dimensions of space and time, but between matter and mindedness: the involuntary and the elicited (Massumi, 2002a,190)

'We' and 'meaning' as the building blocks of another form of relatedness that is not founded on the articulation of identity. We do not 'have' meaning anymore, because we ourselves are meaning - entirely, with no more meaning other than 'us'. Being itself is given to us as its own circulation - and we are this circulation. There is no meaning then if meaning is not shared. Meaning is itself the sharing of being. Everything, then, passes between us. (Nancy, 2000)

This hinge section between Parts Two and Three looks at the performance practice of several artists using KeyWorx as a platform. The microscope falls on a number of issues addressed in these pages and a couple yet to come (the diagrammatic, synaesthetic biogram). Intuition and transduction as thought processes of artistic practice, dissected in the preceding chapters, are explored in the context of KeyWorx performances. This is the link between individual and collective “zones of indetermination” with respect to the indeterminate practice or ontogenesis of improvisational methods; methods that utilise play, spontaneity, chance and unpredictability as processual elements. In the following chapters, multiple aspects of collaborative composition featured in this artist documentation will be situated in a diagrammatic frame. The performance will expose processual and post-performance aesthetics through its playfulness and power relations. Emergent behaviours, trends and aesthetics will be articulated. This documentation consists of captured single frames of movement, the positionable stoppage of a process; sequenced freeze-frames. But it does manage to convey the performative passage of expression into content. It quite literally depicts the transduction of the texted utterance into image content. That passage is nonrepresentational, yet this diagrammatic interval can be sensed in the screenshots that follow.

Thus far, an ontology of relationality has been posited as the basis of processual performance practice.

1. Intuition – a method developed by Bergson and Deleuze to isolate and evolve philosophical concepts is also a “method” available to artists whose practice *is* process; the transformation of the nonrepresentational

2. Transduction – a partial and incomplete process of structuring activity and energies from differentiated domains

Interfacing Radiotopia/KeyWorx – The Process of Making

The project was a performance commissioned for the Dutch Electronic Arts Festival 03.⁹⁷ This project has been chosen because it contains in its process several important components that exemplify the issues at hand:

1. Three groups of artist pairs working translocally from a common improvisational structure
2. An element of audience participation through sms texting
3. A thorough documentation of the preparatory process by one artist group, unusual in this genre, that provides a strong impression of the intensity of social and co-operative strategies and temporal sensitivity
4. The inclusion of discursive and non-discursive techniques and emphasis that illustrate a diagrammatic approach to composition, essential to this study

Invited by Alex Andriassen, Director of the V2_ Media Center, to propose a concept in which KeyWorx could collaborate with the Austrian new media group Radiotopia who specialise in real time mixing of audio samples up and downloaded to their website by the public. He was interested in a live festival performance in Rotterdam during DEAF. A meeting with Rubert Huber of Radiotopia was arranged in January, 2003. After a long weekend, a workable schema, compatible with our respective technologies and aesthetic interests was drafted. Since Radiotopia wanted to focus on mixing sound from the publicly uploaded samples, it seemed best, after much discussion, to limit the KeyWorx players to visualization. Initially we had thought to split the modalities of sight and sound, as well as the performers, leaving only sound in the Radiotopia location and only visuals in the KeyWorx location. After continued discussion, this seemed an arbitrary and uninteresting course to take. It became apparent on the second day of tossing concepts around that the most elegant, if limiting, solution was the simplest one. Stream the audio from the live Radiotopia mix to the KeyWorx players in Rotterdam and New York. This method would by-pass the risk of writing, and testing, a special plug-in for the event in a two-month period.

The present KeyWorx functionality could handle this one of two ways: import it directly into the KeyWorx patcher as a Quicktime audio stream or set up a dedi-

cated computer in each KeyWorx location to receive the stream, in any format, and distribute it through a speaker system, alleviating the burden of extra CPU cycles on the KeyWorx computers. Live Quicktime audio streams are uneditable in KeyWorx, meaning they cannot be processed using the DSP filters and analysis modules available in the application. This is a strange situation for KeyWorx performers, accustomed to thinking of available media as transformable media. The KeyWorx artists in both locales would then share the same, real time audiostream as a “gluing” modality. Radiotopia mixes tend to make extensive use of spoken word files so this lent an additional hermeneutic stimulus to the visualisers.

Four artists were initially invited: Michelle Teran (CAN), artist-in-residence at Waag Society at that time; Isabelle Jenniches (D/NL) in residency at Location One in New York; Lodewijk Loos (NL), Waag Society programmer and KeyWorx developer and Eric Redlinger, New York based artist and KeyWorx developer. I asked Teran to be responsible for guiding the group and growing the concept. Teran invited Arjen Keesmaat, Waag Society artist/developer and Daniel Vatsky, New York based [share] artist to join so that each location would have three participating artists. The preparatory process of each artist pair differed in intensity and length but encountered similar conditions and constraints. Some physical such as the six-hour time zone difference between the Netherlands and New York, and others artistic, such as the structure imposed by Teran on the content differencing. In the article “Collaborative Culture” (Doruff, 2003, 70-98), Michelle Teran writes of her conceptual process:

In an effort to understand how to work with the Radiotopia material and with ourselves, we had to first ask the following questions.

1. What is the nature of the exchange between the two performers connected together over a network?
2. How is each physical space networked? What is the relationship between the three performers in each space?
3. How can the audience enter into this environment?
4. How can the audio and visual environments be connected in a meaningful way?

These questions could not be completely answered until we spent time working together in a KeyWorx space, while, at the same time, working through the Radiotopia material. I have spent two years working in collaborations in KeyWorx. Each exchange that I have considered ‘meaningful’ has developed as a result of the time invested in a connected environment, working together within a set of conditions or thematic focus.

Our satisfaction has been a result of our commitment to the process and also a level of trust between all those involved [...] Initially each performance pair started off separately. None of us wanted to impose a rigid set of rules for the performance. We wanted to start by first establishing, through practice, our personal connections to the media and methods for working through it together [...] Isabelle and I dedicated one month, 15 hours a week, towards developing the performance. Over the weeks, Isabelle and I experienced the transformation of an initial stilted exchange between ourselves through live media into an elaborate synergetic environment that could not have been possible without the two of us present [...] the system that Isabelle and I developed was adopted by the other four performers. (88)

The problem we felt with using just images as input for a real time media performance such as Interfacing/Radiotopia/KeyWorx, is that images have the potential of being too ambiguous. Also the fact that two or more people are working together isn't immediately evident to the 'public' witnessing the visual output. We were wondering if there could be other qualities of the audio that could articulate more the flow of ideas and their visual transformation. We thought that text could be that interface. Audio content, spoken words, physical or emotional responses by the listener, mental visions and other concepts could be interpreted by an individual and then retransmitted as text into the performance. Text also seems more live. (89)

Artists Teran and Jenniches were, at the time of this session, already highly experienced in the Keywork 'users'. They had an established relationship with the limits of the technology and their co-operative inclinations. They were well aware that mutual commitment was essential to honing the process and that commitment, in the case of KeyWorx, means many hours in translocal rehearsals, an unshakable patience and a bleeding-edge thick skin regarding technological failure. They allocated the rehearsal hours, which serve as situated patterning, compressing the lived performance space of the screen into a shared duration in a Bergsonian sense.

Teran had settled on a method for approaching the compositional process; she'd decided to use a Surrealist game structure as an initial condition of play. It had been decided earlier to give the audience in Rotterdam a participatory and vital role; they could enter each session with sms texting. Along with the Radiotopia sound stream, it would be a universal component between the three sessions. The text would be instantiated in all three sessions, though its look, visibility and "feel"

would be idiosyncratic in each. Teran continues:

This meant that three parallel translocal exchanges within each physical space (a room in New York, V2_ in Rotterdam) could be connected by the same word, yet could still be unique in their interpretation of that word. We also used a webcrawler, a KeyWorx module that calls up images from a Google by typing in searches. The input of live media directed the visual flow in unpredictable ways. In our performance, Isabelle and I focused on improvised writing, using our generation of text to call up images from Google. During our four hours of non-stop writing, a continuous flow of sms words bounced from my text to hers and vice versa, resulting in a dynamic stream of impromptu word and image associations that were alternatively personal, playful, banal, incoherent, poetic and emotional. (89)

Teran and Jenniches, unlike a majority of artists that favor improvisational methods, prolific documenters. The following dialogue between Teran and Jenniches has been placed on Teran's personal website.⁹⁸ It is an extraordinary snapshot of a process of making; from invention to "product" which culminated in the performance of 1 March 2003 at DEAF. The other artist pairs, Lodewijk Loos and Eric Redlinger, Arjen Keesmaat and Daniel Vatsky, did not document their rehearsals, but images, captured from KeyWorx during the performance of sections of their output are reproduced here.

There is a notable instance here that, in general, the women attracted to networked performance in KeyWorx are ardent documenters and tend toward a structured, aléatoric approach to improvisation. In this style of composition contingency is exponentially linked to the number of collaborating makers. In this documentation of the making of a performative experience, it is apparent that the two other groups of improvisers did not archive their preparations for the event or the actual performance output. Only four clips survive from the four hour performance of Loos/Redlinger and Keesmaat/Vatsky. V2_ had technical problems with their server during the DEAF03 festival and the archived streams were unfortunately lost. That much of the performance material has not survived is certainly coincident with the ephemeral nature of improvisation. For purists, this is the way it should be. It not only respects the aura of "you hadda be there" that pervades improvisation as a style, but also, like Heisenberg's uncertainty principle, brackets the act of observation (in this case documentation) as affecting the production or transduction of the performance, often in adverse ways. That debate aside, the archived material from

Teran and Jenniches provides a remarkable window into a three-week process from a first person perspective.

Note: The following text that appears in a Lucida sans serif font is taken from Teran's documentation on her personal website. It is the artists' account of an intensive three week preparation process. The rehearsals take place translocally in the KeyWorx shared environment between Michelle Teran in Amsterdam and Isabelle Jenniches in New York. The original text is unedited.

Interfacing Realities: Artist Documentation

Interfacing: The Process of Preparing for the Indeterminate Michelle Teran and Isabelle Jenniches



Figure HII.1: Diagram of the placement of screens ad performers in the KeyWorx space of the Interfacing/Radiotopia/KeyWorx performance (Teran, 2003)⁹⁹

SPACE 1

[*Radiotopia*] Walk into a theatre and enter an audio space with no images. Artists from all over the world are asked to send in audio material to fill up a database. Behind every sound is an idea, a world of words and definitions. The one big experience with Radiotopia is the peaceful confrontation of all the world's sounds, audio artists, concepts, sights and sometimes ideologies. In the Scapino theatre, the sound is mixed live by musicians and resent as an audio stream.

SPACE 2

[KeyWorx] Walk out of the theatre, down a narrow hallway and enter a space filled with images. Three artists sitting in the space, are connected with three artists in New York City. Three translocally linked pairs, three simultaneous and connected performances.

Behind every sound is an idea, a world of words and definitions. In the KeyWorx space, one listens to the world of words within the audio-spoken words, ideas, emotions, memories-and translates that world into actual text.

Inspired by a Surrealist game 'Parallel Stories', a word sent by performer or public from a mobile phone in response to the audio appears simultaneously in all three performances. Each performance pair responds to this foreign text input sent via 'sms' by creating a visual story around it. Three parallel translocal exchanges within one physical space (a room in New York, the V2 bookstore) are connected by the same word yet are unique in the visual interpretation of it. The performance is improvised and created collaboratively in real time.

These compositions are projected onto the screens throughout the V2 space.

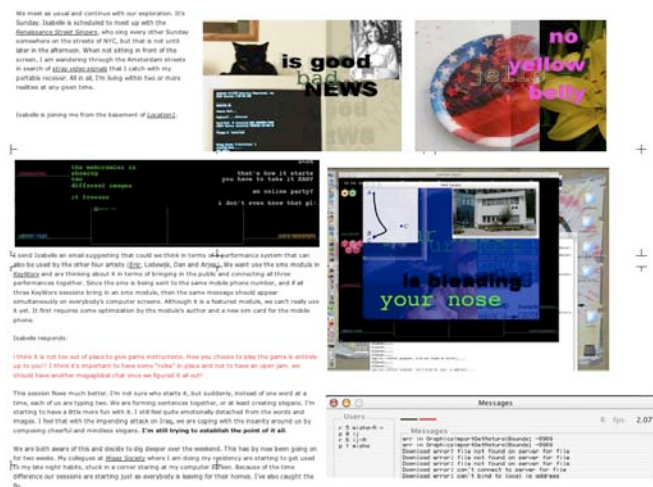


Figure III.2: The image above is a screen shot from Michelle Teran's website documentation compositing a daily collage of images from the rehearsal sessions with Jenniches.

February 5

Michelle interfacing

Isabelle is in New York. I'm in Amsterdam. We're friends. We like to work together. There is a conceptual synergy in our practice. We finish each other's sentences.

How can the audience enter into this environment? How can the audio and visual environments be connected in a meaningful way?

Isabelle responds. "Something meaningful...yes, that would be good. Without being too much "in your face" I find that hard sometimes when working with images only, they are signs after all, either ambiguous or clear. It might be interesting to use the Webcrawler module. I did it the other night and had great fun. Just type in "war": for example and you get some amazing stuff flying past. So, this could be an option (and we could come up with some more specific keywords). And, as always, make it clear that this is a _collective_environment, that what ppl see is not the expression of one dictators lone vision but the outcome of a shared creation process! Isn't that already quite amazing especially these days when we are confronted with the "I do it and I do it alone" of our monkey leader!?! is a sign of HOPE in a social structure that is based on competition and personal ambition!!! In New York, everybody again and again tells me, that's what rules here!

For us, it's a personal way to connect, allowing for perhaps more emotion and content. It enables us to combine casual chat exchanges, with more focused artistic expressions within the same virtual space. I am comfortable with this hybridity. I am more comfortable with this ambiguous state than the ritual of taking an image or a bit of video and processing it to the point of abstraction. It looks all the same to me. The fact that two or more people are working together on the same KeyWorx patch isn't relevant to the 'public' witnessing the visual output. But this is my dilemma working with a software that is somewhere between a chat/teleconferencing and vj tool. How do we translate an intimate connection between two or more people into a public performance? I write Isabelle an email suggesting that our exchange should be very simple and clear in terms of what the interaction is. The beauty of the connection is through the conversation, through text and image. Lodewijk Loos, one of the programmers for KeyWorx been working on a webcrawler module. Typing in words using a live keyboard calls up images from.

We start by patching in our chat into the webcrawler and see what images come up through the process of our conversation. Gradually we move to a question and answer exercise, where we take turns interviewing each other. We work for three hours, before we realize we have forgotten to document the process. A day later Isabelle sends me an email suggesting that we try a word association game to help develop our affinity with the new web-crawler. The game is simple. When she types a word, I respond by typing an associative word and vice versa. She sends me a gameboard template in the mail

We meet once again. I'm at *Waag Society* sitting at a desk. She has travelled in the bitter cold from her apartment in Brooklyn in time for a public library in Manhattan to open. She has mentioned before that she experienced a whole new life when discovering the free bandwidth in the library. It allowed her to escape from the hot, airless bunker known as the residency studios at Location1. I'm still trying to deal with the fact I am carrying out our exchange from an office space. **Is this our future? Making art in office spaces?**

We start with a split screen. I am on the left and she is on the right. We keep to our sides and try to play the game. We start. The whole process for me is initially awkward and slow. The word association is for me stilted and banal. I struggle to continue, hoping that the flow will come. It's moving too slowly for me and start inserting words quicker. Isabelle thinks it is moving too fast. With the threat of war and saturation of mainstream media propaganda, she is feeling nauseated by the flow of images.

She sends me an email.

"are you having a serious problem?" "I feel we have to play this game VRY VRY SLOWLY, let the images do their thing."

It's not really a reprimand. We are just trying to establish the connection.

February 9

We meet as usual and continue with our exploration. It's Sunday. Isabelle is scheduled to meet up with the *Renaissance Street Singers*, who sing every other Sunday somewhere on the streets of NYC, but that is not until later in the afternoon. When not sitting in front of the screen, I am wandering through the Amsterdam streets in search of stray video signals that I catch with my portable receiver. All in all, I'm living within two or more realities at any given time.

Isabelle is joining me from the basement of *Location1*.

I send Isabelle an email suggesting that could we think in terms of a performance system that can also be used by the other four artists (*Eric*, Lodewijk, Dan and Arjen). We want to use the sms module in KeyWorx and are thinking about it in terms of bringing in the public and connecting all three performances together. Since the sms is being sent to the same mobile phone number, and if all three KeyWorx sessions bring in an sms module, then the same message should appear simultaneously on everybody's computer screens. Although it is a featured module, we can't really use it yet. It first requires some optimization by the module's author and a new sim card for the mobile phone.

Isabelle responds:

i think it is not too out of place to give game instructions. How you choose to play the game is entirely up to you!! I think it's important to have some "rules" in place and not to have an open jam. we should have another megaglobal chat once we figured it all out!

This session flows much better. I'm not sure who starts it, but suddenly, instead of one word at a time, each of us are typing two. We are forming sentences together, or at least creating slogans. I'm starting to have a little more fun with it. I still feel quite emotionally detached from the words and images. I feel that with the impending attack on Iraq, we are coping with

the insanity around us by composing cheerful and mindless slogans. **I'm still trying to establish the point of it all.**

We are both aware of this and decide to dig deeper over the weekend. This has by now been going on for two weeks. My colleagues at *Waaag Society* where I am doing my residency are starting to get used to my late night habits, stuck in a corner staring at my computer screen. Because of the time difference our sessions are starting just as everybody is leaving for their homes. I've also caught the flu

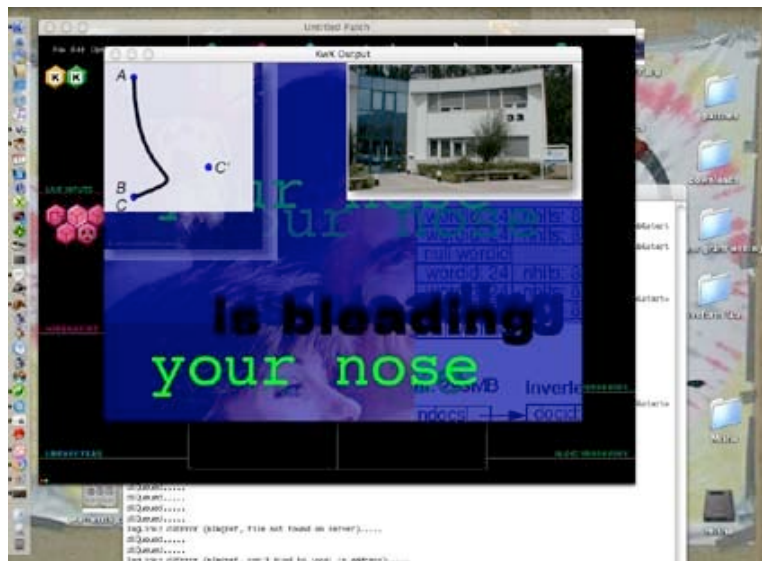


Figure HII.3: Screenshot of image layers from bottom to top – desktop, chat window, KeyWorx Patcher, KeyWorx Realizer wit Google images and live text between Teran and Jenniches

February 11

A visit to Rotterdam extends the experience of two girls working together via their power-books into other spaces. Radiotopia will be in the Scapino theatre, a visually neutral black space filled with sounds. A walk down a corridor leads to the *V2 bookstore* where our performance will take place. The bookstore is a funky space filled with shelves, counters and bright yellow stairs. I immediately love it. We'll add to cluttered space by filling it with projected images. The performers will sit on the stairs and counter tops.

A Sunday spent in bed reading a book and trying to recover from illness reveals a Surrealist game with text.

PARALLEL STORIES

For two preferably three or four players.

The players each write a text and must integrate into it 'marker-words' which are announced in turn by the players. In this case there is no rule concerning hidden words and the frequency of the 'marker-words' is not necessarily specified.

Alternatively the 'marker-words' may be announced by someone outside of the game, or may be recorded on a tape-recorder beforehand.

In this example, 'marker-words' are in bold in the text of the player who introduced them into the game.

... no, not at all it was a drawer full of **SHOETREES** which resembled the Somme Estuary at low tide when the vases uncovered the dead plumbers in the green canoes like **SUBSTITUTES** for mint spirits in a glass. And space grew greater further out in the shark's direction as he circulated, alert as an **ARTICHOKE** flowering in the wind of June peopled with fencers in the guise of birds and haywains that waddled along playing at **SHEARS** on the crania of the children of the baker who rightly dashed upon his **HAMMER**.

After reading this, I realize that Isabelle and I have been moving intuitively towards this type of automatic story telling. An infinite amount of parallel stories can be told using text, image, 2d graphics, or live video, each one unique based on the personal interpretation by the performers.

The *Radiotopia* project talks about how with every sound, every piece of audio there is a word, an idea or meaning.

We have been thinking all along of other qualities within the audio that could articulate more the flow of ideas and their visual transformation. We now think that text can be that interface. Audio content, spoken words, physical or emotional responses by the listener, mental visions and other concepts, can be interpreted by an individual and retransmitted as text into a performance using sms.

I suggest to Isabelle that we try to incorporate 'Parallel Stories' into the performance. It is potentially good in theory however, we do not consider ourselves writers, so it could also fail. When we meet that day we go on with the experiment. It starts badly, both of us feeling self-conscious. After two hours a breakthrough starts to happen as our writing starts to flow better. I'm excited as streams of information of all matters, all things, all ideas, some profound, some illogical, some intimate, some banal go whizzing by us. We play with the 'marker words' that bounce from my text to hers and vice versa, playing with the string of associations that spiral off. We're both satisfied.

We're still working quite simply in terms of form. We decide to refocus on aesthetics. Isabelle has now caught my flu and is bedridden for a couple of days. I'm still sick and also frustrated because the sms module is not quite ready for use. I'm anxious to start to incorporate it into

the next session.

February 15

We recover from our illnesses in time to attend protest rallies against the pending war in Iraq.

Isabelle, with thousands of others are prevented by the police from joining the main rally. While other New Yorkers confront the police and yell "whose streets are they anyway?", Isabelle and her partner duck under the barrier and head towards Time's Square.

I'm in the middle of Dam Square in a sea of friendly strangers. I spot a friend, a 2 m tall Serbian performance artist who is waving a huge placard with the slogan "Think Pink". We spend the day immersed in words. Cries, chants, and music connects the flowing mass. The whole day gives me a brief hope and brings me back to my local habitat. We've been spending too much time in front of the screen. We need to reconnect.



Figure HII.4: Image from Teran's website documentation

February 16

We continue on Sunday from the comfort of our temporary homes. I'm happiest when worlds ("online" and "real") are merging together. What we have experienced yesterday with the global anti-war action doesn't seem separate from what we are currently mediating through the software. With the memory of the social network formed around the protest still fresh in my body we embark on another session.



Figure HII.5: Image from Teran’s website documentation

email to isabelle from michelle:

Right now i am trying to make some presets for text/image/bg image algorithms that might be useful, perhaps similar to the presets that you are using in image/ine.

I've just made myself a third (!) cup of coffee and am going to make a patch using the array and multi input function, using the keyboard as a trigger. I'm thinking about different bits of movements, and aesthetical flows that might be nice to work with. You can join me at any time.

email to michelle from isabelle:

c%|!

let's give it a try i've been thinking do i necessarily be on a fast connection? if we work w/ txt and a few mock-up images i could even connect from home. then i could jump in right now, otherwise it'll be 4pm from the bunker. whatever, soon!

The environment is becoming so intertwined that if we make small changes, for example in the value of one parameter of one module, this change affects the entire patch. We are creating an elaborate live system where not one object exists independently. The sum is the whole of it's parts. The liveness of the patch is dependent on both of us present. We're in a new state of synergy.

And it's beautiful too!

We work for 8 hours together.

Later on I join her again briefly from *SHARE*. It's been a long day for both of us. We connect for 15 minutes to say a quick goodnight.

The next day, I open up the patches we saved from the day before. There is nothing there.

February 18

The sms module is now ready for consumption. It will be used for inserting the 'marker words' into our '*Parallel Stories*'. The sms module receives a message sent by a mobile phone and displays it as text in the patch. If all three KeyWorx sessions contain an sms module, then a word sent from a cell phone by a performer or public, in response to the audio, appears simultaneously in all three performances. This means that three parallel translocal exchanges within one physical space (a room in New York, the V2 bookstore) can be connected by the same word yet can still be unique in their interpretation of that word.

Lodewijk, *Eric*, Dan and Arjen are enthusiastic about working with this game structure. Isabelle and I decide to rehearse together one more time. A general rehearsal with all six performers is planned for the next week.

Isabelle and I work for another three hours. Neither of us has a cell phone for that day, so we are telnetting directly to the sms server. Tom has warned us that the sms module is not infallible. When an sms is sent from the mobile phone, the slots on the server get filled up (1-10) and then are not replaced by new messages. We have no way of testing this now, but decide to just go ahead and do it. We start working and immediately it starts to click. The insertion of this text fragment coming from outside sources is proving to be the necessary glue.

A word appears in the center, causing a rupture in the story flow, leading it to unpredictable directions. I am incorporating typos within my narrative. I try to type a word, but something else comes up. **FEETS, FEST, FIESTA, FOOL, second ring? bull terra here china blue me make good wife les favorites du jour ...**

A stream of logical or incoherent thoughts flow out of me unedited, unhinged. I can't stop and I don't seem to get tired.

February 20

We start with a little six person chat. The conversation is scintillating. First 30 minutes is devoted to confirmation that we actually exist. We use *iChat*. Arjen and I are sitting side by side and communicating through this ridiculous interface. "Hello is Lodewijk there?" "Hello is everybody there?" "Hey where did Eric go?" "Isabelle is here"

Next step is to find an internet radio station that we can all listen to and grab 'marker words' from it. About a half an hour passes by until we can agree on one, but eventually a spoken word station from Chicago suffices. Now we are in a synchronized audio space, but still in the ridiculous iChat environment.

Next stage towards the translocal trance dance: enter into the *KeyWorx* multi-user environment. Three virtual spaces, two players per space. Thirty minutes of negotiation. "Which software version should we use?" "Which space should we join in". There is a general bumping and joking around as we crash into each other's virtual spaces. Sometimes all six in one. Like chil-

dren who have consumed too much sugar, we are hyper and unfocused, unwilling to take anything seriously

Rehearsal day with all six performers...


I keep on thinking that my theory about 'human to human active network synchronization in connected space' is unsound and even overly negative. **However, I honestly think that it takes at least two hours to 'settle down' before the real work can start.** We start at the Theatrum Anatomicum of Waaag Society with a network breakdown. This is not due to electricity, but an unfortunate renovation in the media lab downstairs. A floor sanding intervention has disconnected the internet connection and left us cut off from the rest of the world. At first disoriented, we adapt quickly by grabbing a handful of ethernet cables and rushing over to Sister O's studio at STEIM. We manage set up and make it in time to say hello to our collaborators, who have joined us over fresh danishes and coffee from Dan's apartment in New York. Arjen and I are at STEIM, Isabelle, Dan, Eric, together in New York, Lodewijk is the only one alone, joining from Utrecht.


+


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+

 **loetmans@mac.com:** what do you mean er?

 **ecmedesjourns:** since she is usually prompt

 **Michelle Teran:** do you have her phone #?


 **ecmedesjourns:** your icon, LW, is a guy taking money from a stranger

It amazes me how these types of connections can degrade into the absurd. Of course we should be ridiculed. Why should we be taken seriously? While these transactions are going on, the rest of the Anatomic group are sitting on the floor and trying to grasp what is going on. Our backs are to them. Saying something like "we are presently involved in a six person rehearsal between Amsterdam and New York", could be the same as "I'm controlling the wind patterns on a mountain top in Japan with my mouse movements", or "I'm checking my email". To them, we are just a couple of people stationed in front of computers.

And then suddenly, without warning, all six of us are in sync. It has been 2.5 hours since we first logged in. Now we get to see if we can actually work together. Arjen is connected with Dan, working together for the first time. Eric is with Lodewijk. I continue with Isabelle. The basic test is to see if the sms works for all of us. Shortly we are all in our own worlds, linked together by the endless passage of

 **cavtypepeeps:** hi isabelle

 **ijnewyork:** hello all!!

 **Michelle Teran:** hi there ij

 **Michelle Teran:** eric, we have been working on that type of exercise for about three weeks now

 **ijnewyork:** love your logo, micha

+

 arrimafkees@mac.c...

 cavtypepeeps

 ecmedesjourns

 ijnewyork

 loetmans@mac.com

Next stage towards the translocal trance dance: enter into the KeyWorx multi-user environment. Three virtual spaces, two players per space. Thirty minutes of negotiation. "Which software version should we use?" "Which space should we join in". There is a general bumping and joking around as we crash into each other's virtual spaces. Sometimes all six in one. Like children who have consumed too much sugar, we are hyper and unfocused, unwilling to take anything seriously.

 **loetmans@mac.com:** do you guys have icons?

 **ecmedesjourns:** yeah

 **loetmans@mac.com:** i little yellow man?

 **cavtypepeeps:** much better

 **ecmedesjourns:** and eyeballs

 **cavtypepeeps:** hi isabelle

 **ijnewyork:** hello all!!

Figure HII.6: Teran's screenshot collage of the iChat communication during a rehearsal with the full group.

MARCH 1, 2003 – The Performance

I am sitting in a darkened room filled with screens. Lodewijk sits by the entrance. Arjen on a stool by the corridor exit. I sit on the stairs. We are all dressed in yellow to distinguish ourselves as performers. I wear a yellow wig and stare intently at my computer screen. Through the door, down the hall are the Radiotopia guys, bringing in sounds from the internet, into the theatre space and sending a stream to us. The sound is initially extremely quiet. A public spills in and stands around awkwardly staring around the room, before heading towards the bar. Later on, acclimatized and relaxed, they start to trickle back in.

[Isabelle's report] Dan sets up a poker table (soda can slots and all!), lights some candles and orders plates of middle-eastern food. Passers-by glimpsing in through the big ground level windows witness a semi circle of silver powerbooks and three obsessed young people in the middle of an elaborate technostic seance. Barely lifting their heads, but typing away frantically, at times bursting into laughter for no visible reason, the clue must lie inside the glowing screens.

I'm not fully conscious of what I am writing. It just flows. Lodewijk and Arjen are engrossed with their partners, glancing from their keyboard-to screen- to keyboard - to screen. People in the room are sending sms to us. Their messages bounce around simultaneously on all of our screens. We comply with offerings, images, secrets, embarrassments, emotional rollercoasters, wonderment, and sheer nonsense.



Figure III.7: Screen grabs from the Teran/Jenniches documentation. They are representative of captured moments which link sms text messages sent by members of the Rotterdam audience to the performers. The texted messages “debra” and “allelujah” are configured centre screen in a purplish hue and a sans serif font. Teran and Jenniches consistently develop that diagrammatic pattern. The audience contribution driving the selection of images from the Google search engine is centred and visible on a foregrounded layer.



Figure HII.8: Screenshots of the Realizer from Teran's website

DONUT

Between **DONUTS** and corrupt cops, i don't know where to start. I mean, has the whole world gone completely insane? insane? do you know what i mean? i try to stop these feelings inside me, but somehow they can't be suppressed. i have bad dreams about this. i'm lying in water, a plane falls over me, then suddenly there is a huge crash. and there is falling glass over me. my head gets cut. i can no longer see.... there is screaming and then everything goes black...oh shit...we were talking about **DONUTS** weren't we?

DONUTS are a real drag. It's just that shape already turns me off!

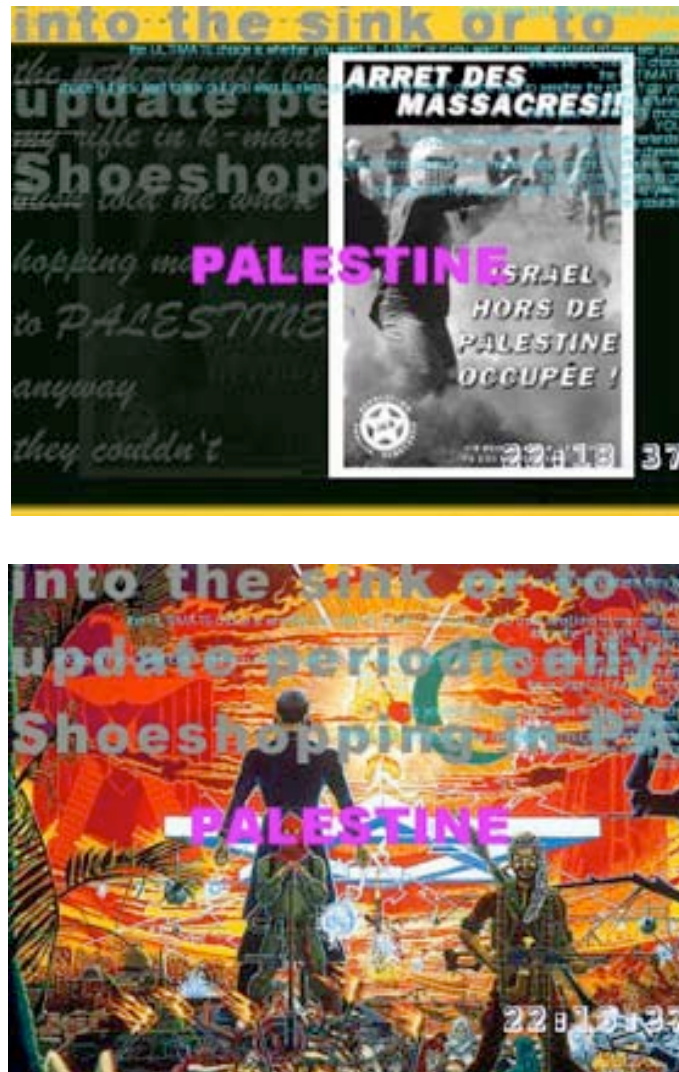


Figure HII.9: More screenshots from the performance

BENEATH THE VEIL, INHALE, COMMITMENT

BENEATH THE VEIL, they are wearing lipstick, mascara, long lashes, fish net stockings. they are lawyers, doctors, they love their children, they go to work, they know how to sew, they **INHALE**, they are not afraid of **COMMITMENT**, they love their mothers, they walk to school even though they are only seven, (that's a very brave thing to do by the way), they love taking risks, they have a sense of **COMMITMENT** towards the game, whatever the game might be. can you think of a game we might play? I like to see what is **BENEATH THE VEIL**, n a rather virtual **COMMITMENT** she donned her **VEIL**

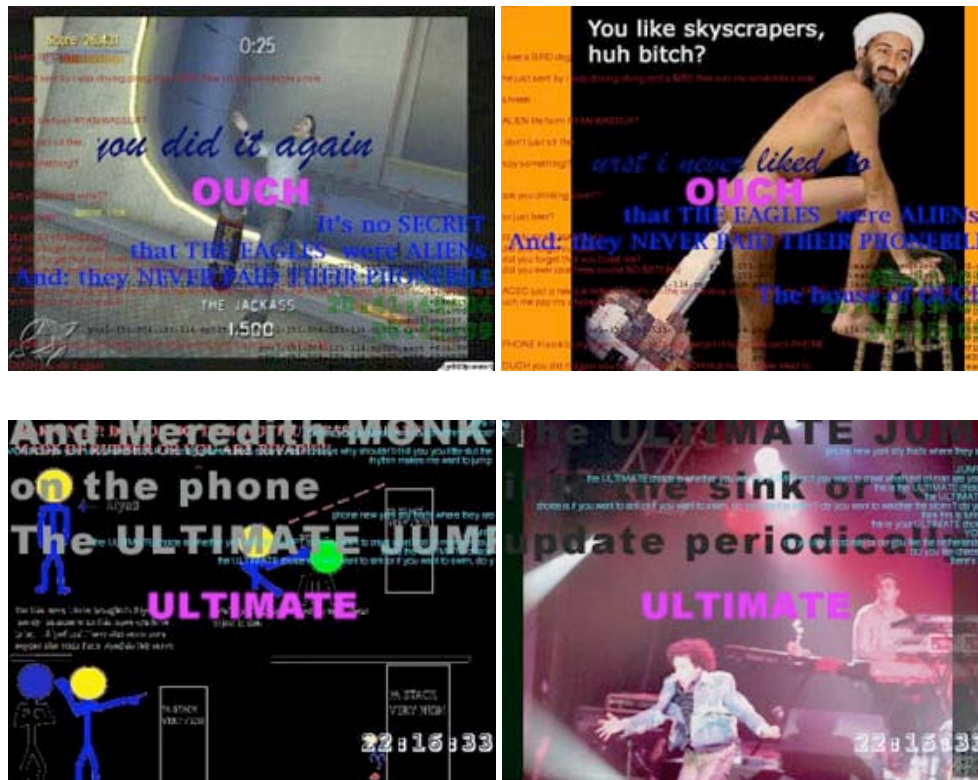


Figure HII.10: More screenshots

People sit/stand beside us, lay against the walls. It is quiet and contemplative. Some stay for hours. Some come up and talk to me, makes comments. I'm willing to share myself with them, even though I cannot give them my full attention. We participate together in the digestion and transformation of words, of experiences,

Although basically incarcerated by my keyboard and screen, I start to incorporate my physical actions into the narrative. I feel it perfectly valid to announce that I'm going to take a break, walk across the room, go to the bar and grab a beer. I feel comfortable to mix together the banal and profound. I type the words, "ij, if you'll excuse me, I'm going to stand up now and walk across the room. I'll be with you shortly". The public is broken out of the screen trance for a moment, by my movements across physical space

ij: It felt very good to do this! I loved the weaving in and out of realities: if it was misha writing about bathroom break or the SMS keyword or the flow of images or misha (being back from the bathroom) writing her guts out, or a glance into a book next to me, or a glance into a screen next to me - all inspired the writing and got merged into the flow of words. The key-words held it together, and held us together as well, I felt! We were all on the same trajectory but in different ways.

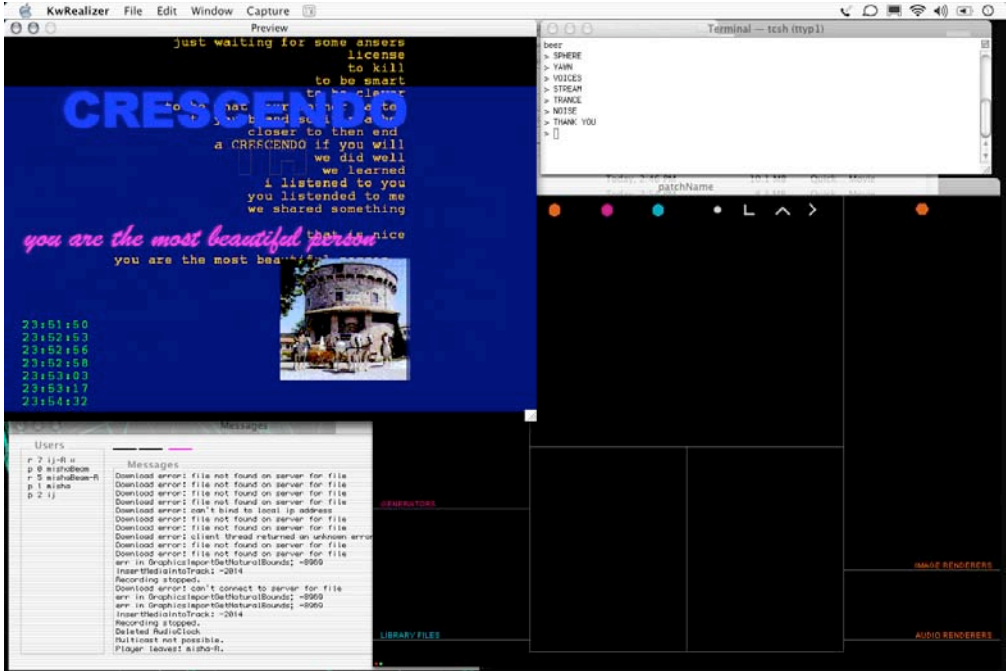


Figure III.11: Screenshots from Teran's computer during the performance show the Realizer output window in the top left corner, the message window in the bottom left corner that provides data on the states of the instantiated modules and the players present in the session. The top right window is Apple's terminal which Teran and Jenniches used during rehearsals generate text messages that would be in the performance with sms messages from the audience. The bottom layer is a full screen KeyWorx interface.

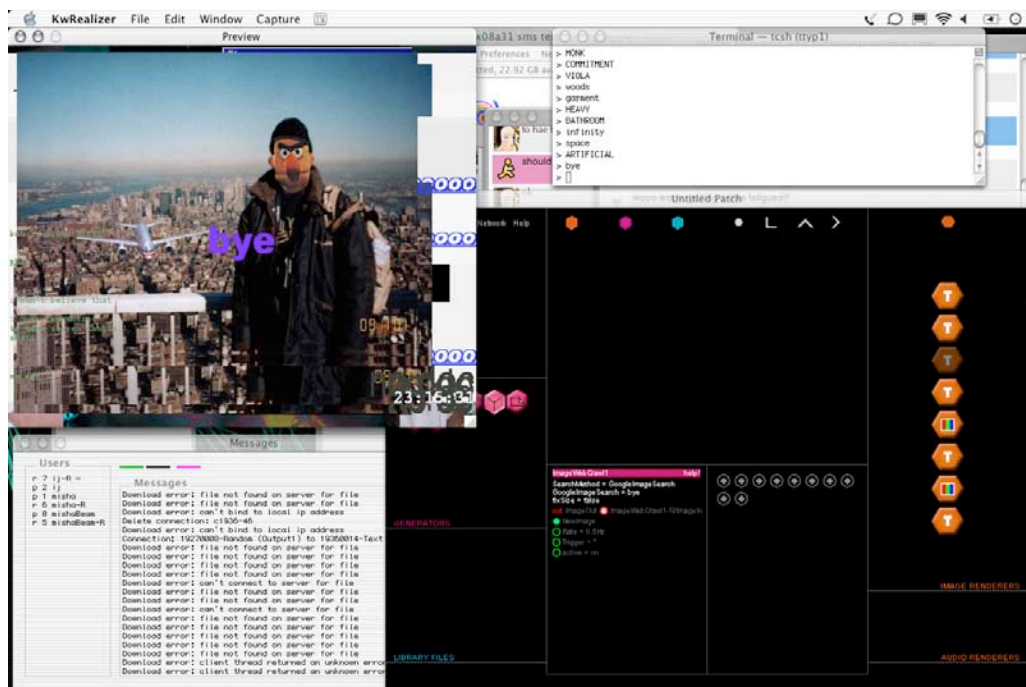
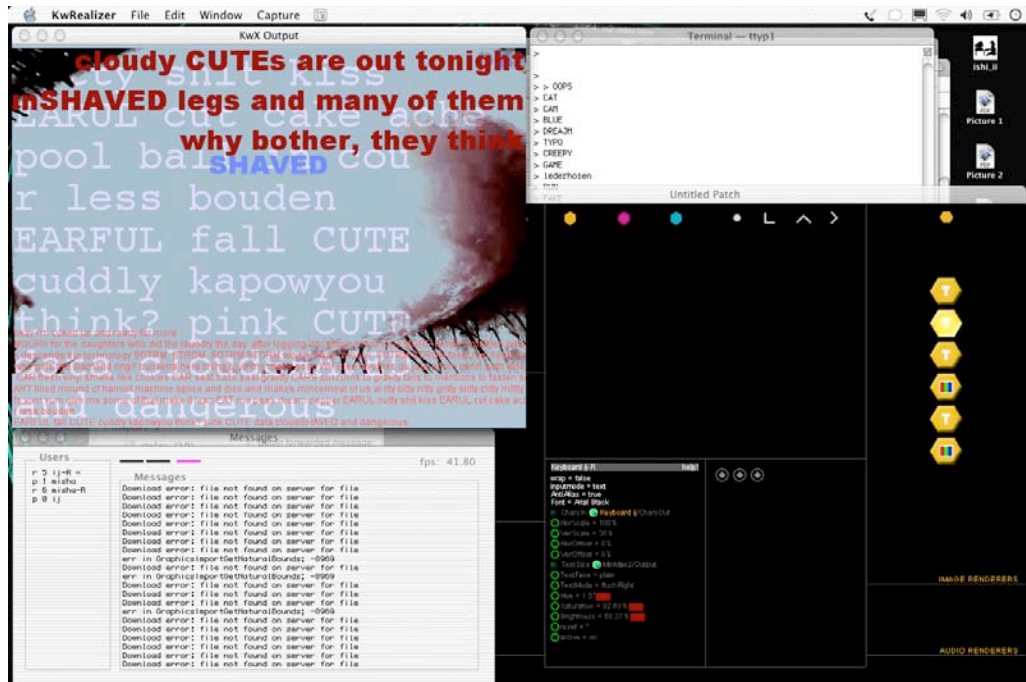


Figure HII.12: Another screenshot from Teran's laptop. The KeyWorx output was beamed to a screen in the performance space (V2_ bookstore). In this image the iChat window is visible behind the terminal which was another communication channel used during the performance.

Interfacing Realities and Rhythm

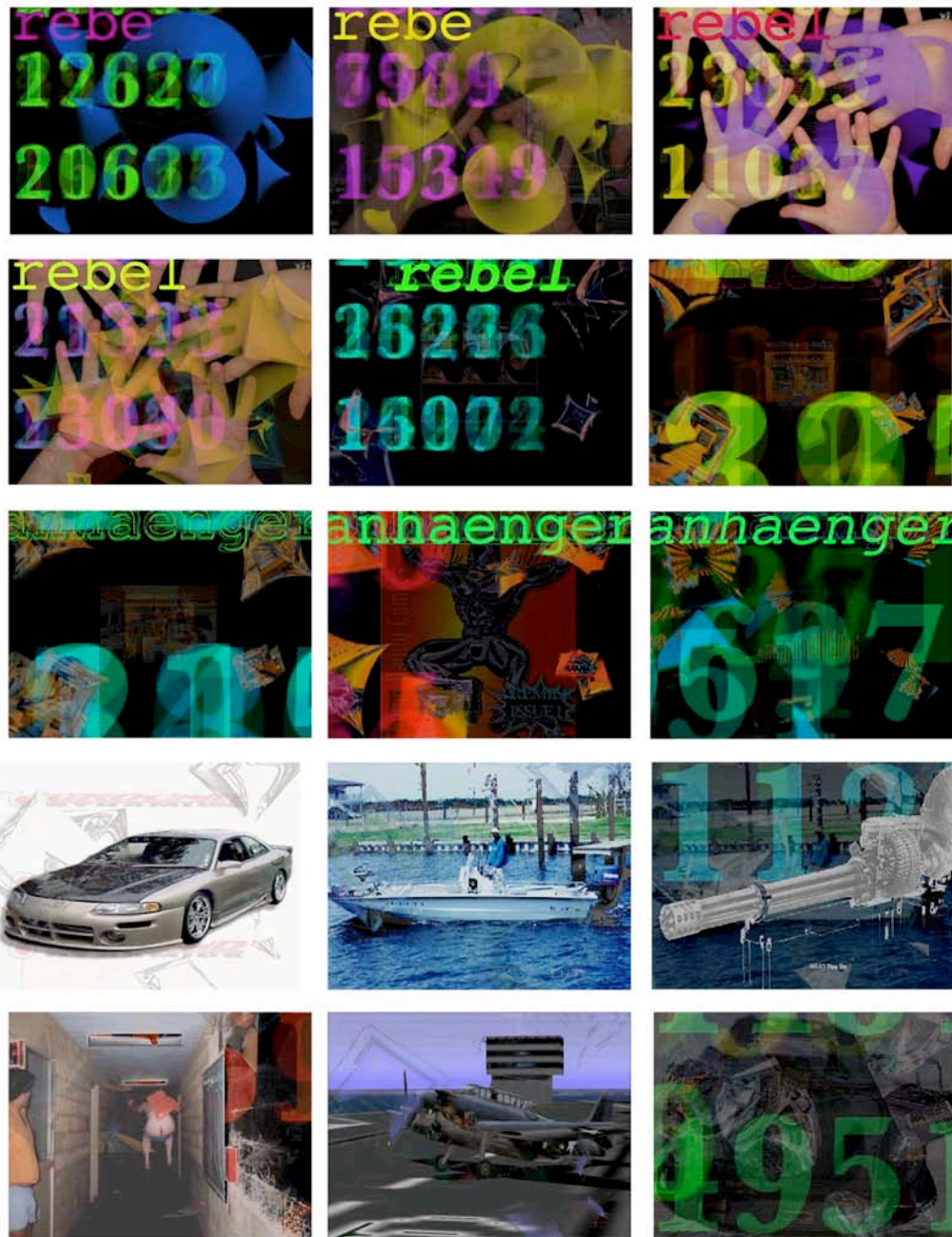


Figure III.13: Screenshots from Keesmaat and Vatsky

*"The diagram is indeed a chaos, a catastrophe, but it is also a germ of order and rhythm."
(Deleuze, 2003, 83)*

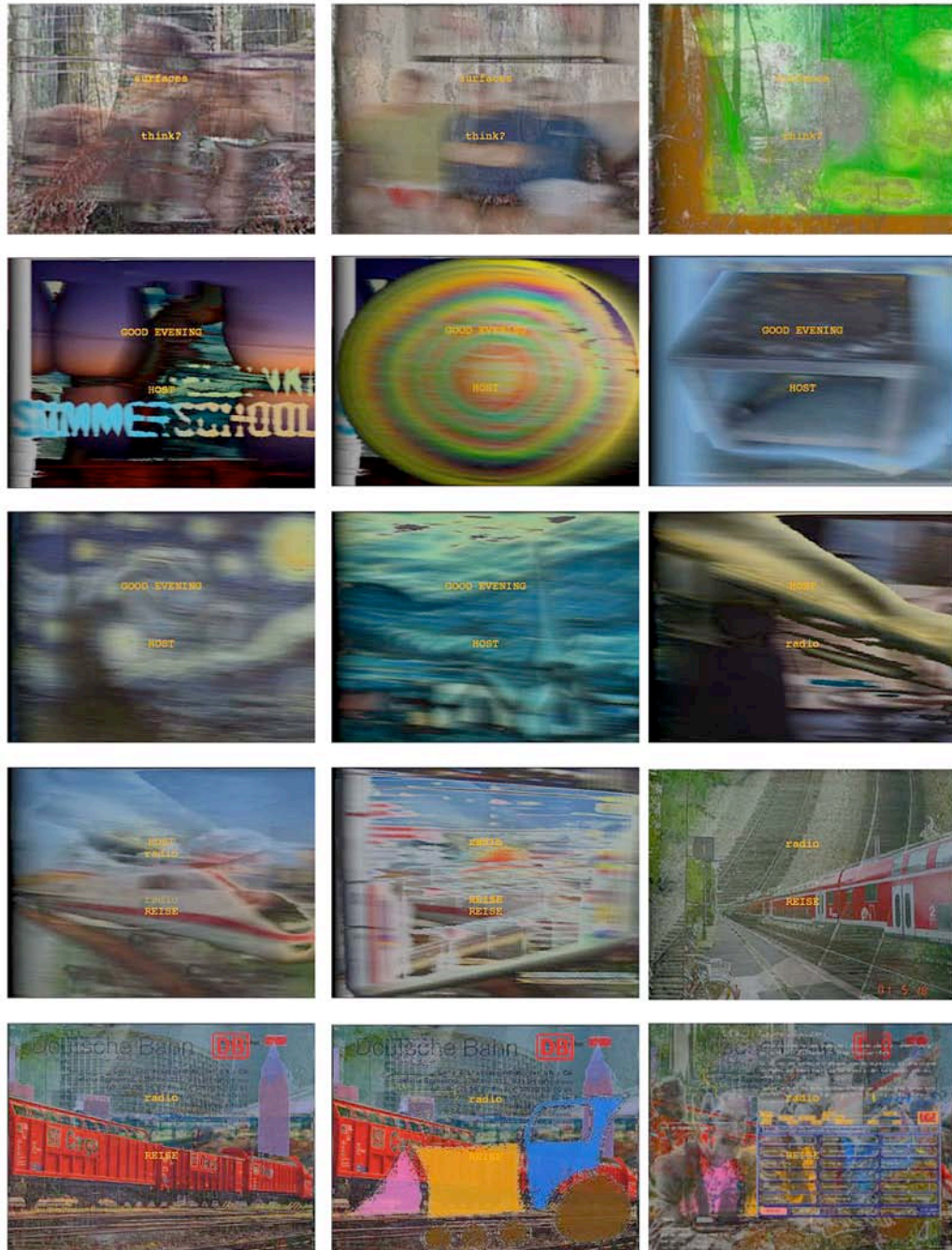
Interfacing Realities and Intuition



Figure III.14: Screenshots from Teran and Jenniches

We define the abstract machine as the aspect or moment at which nothing but functions and matters remain. A diagram has neither substance nor form, content nor expression [...] Whereas expression and content have distinct forms, are really distinct from each other, function has only "traits," of content and of expression, between which it establishes a connection: it is no longer even possible to tell if it is a particle or a sign [...] Writing now functions on the same level as the real and the real materiality writes. The diagram maintains the most deterritorialized content and the most deterritorialized expression in order to conjugate them" (Deleuze and Guattari, 1987,141)

Interfacing Realities and the Catastrophe



FigureHII.15: Screenshots from Redlinger and Loos

"In the unity of the catastrophe and the diagram, man discovers rhythm as matter and material." (Deleuze, 2003)

Following a Deleuze-Guattarian line of thinking, the actual signifying product, the content of expression, the by-product of processual encounter in these KeyWorx sessions, emerges from the capture of emergent potential. To become a representative object-thing, it must pass through a zone of indetermination. Emergence emerges; all is contingency and bifurcation. The element of chance in this passing through is a surprisingly contentious issue in the performing arts. We will explore this in the next chapter.

Extracts from KeyWorx Artist Interviews

In 2004 I conducted six 90 minute interviews with artists who have used KeyWorx as a toolkit for translocal performance (Doruff, 2005b). An interview template of sixty-seven questions was employed as a structure for these conversations but it was loosely adhered to. The premise of the interview strategy was to informally step through the procedures, conditions, techniques and aesthetics of artists regularly participating in KeyWorx performative events. A few short excerpts from conversations with artists from the *Interfacing Realities* event have been selected. See the Appendices for further excerpts.

Michelle Teran (CAN):

SD: What is the degree of improvisation that's determined by you and what is co-determined?

MT: Well, you're talking about case-by-case scenarios. Because you know, with Isabelle (Jenniches) and I, when we created this whole gaming performance system for DEAF, we didn't actually know where we were going but we started with: okay, this is our fundamental - just image and text and working with Google and my text. Then we started with sms and then it was through a repetitive process that we came to what it actually was. So in all, that took us about five to six weeks of meeting. Just repetition, repetition, repetition. So the process would be: defining the rules and then having maybe two hours working within that rule set, and then having an evaluation through email. But also to be thinking about what just happened and looking at other sources. So going in and forging around and finding some context for it.

SD: But within this context you were building towards a performance; would you do that if you were just playing around, if you're using it just as

a meeting space?

MT: Yeah, but we haven't actually just used it as a meeting space [...]
It's kind of like a sketchbook, but it's not like a sketchbook without aim,
it's some goal-oriented task that we set for ourselves and then it's used.
Like any of the other tools around. When I started I used to drop into chat
rooms and video conferencing rooms, and kind of hang out and I found
that really boring. But if you're doing a performance, with I-visit for exam-
ple, and then people were doing a performance and somebody was sending
music, that's a whole different thing, because then there's a reason for you
to be there.

SD: Can you at all describe how you reach a synergetic dynamic and if you
can, how long does it usually take you to get to that synergetic dynamic?

MT: Two hours. At four o'clock in the morning (laughing). Time, repetition
and knowing the person.

SD: So there is no generality that applies there?

MT: You've got synergy after repetition, usually you reach a synergy after
you have... okay in my... is this truthful? It just gets more and more deep.
Just like with anything, it just gets deeper.

SD: And that, depending on the person, can that take 20 minutes or does it
require a few hours?

MT: I think that you have to really get into that mode, personally. I think
that what you do after 20 minutes is different from what you do after an
hour, after two hours.

SD: Have you noticed that that is dependant at all on the time zone the
other person is in? How much time it takes?

MT: Yeah, time is also a really interesting element.

SD: The metabolisms are working at a different rate.

MT: Yeah, but I've worked for the most part in time [different] zones, so we always worked in a slightly different state. I was starting at midnight or I was starting early in the morning...

SD: So that doesn't necessarily reflect the amount of time it takes to get to that synergy?

MT: No I wouldn't say so, I would say that, if you have gone through that process several times, then maybe you would get to it faster, but then sometimes it takes you by surprise, maybe you get to a point where you just reach into this ... this other level that you didn't quite predict.

SD: ...the "aha moment", does it feel different when you're in KeyWorx than when you're in a Walk?

MT: Yes. Cause you get into this rhythm, right? Yes, you get into this moment where there's a rhythm going on, where you say: "oh, this is becoming something good". So it's like a moulding process and it takes you someplace and then you're there. But just the experience that you can see what's going on and that you're part of... everybody's working on the same thing.

Isabelle Jenniches (D/NL):

SD: Do you plan a kind of structured approach before entering or do you just say: "let's meet in a KeyWorx session."

IJ: Usually, there is a little bit of structure. Like, usually we are working on a project together or we want to brainstorm on something together and even if it's just for fun, you know, your hobby is your work, so usually there is a framework, an agreement on media or something...

SD: Can you give me an example?

IJ: Yeah, I have a friend in New York that I always work with audio with. So then I know that's the deal. We get a live audio feed, or a generated audio, since that's broken in KeyWorx. That's the deal and we share a lot of aesthetic desires so it's graphical and minimal and this is kind of implicit.

SD: Do you agree ahead of time on what elements you might bring? How

much of that is spontaneous, how much do you see what is happening in a session?

IJ: It's actually a very small agreement. It was very interesting, a couple of weeks ago Eric [Redlinger] actually wrote me a letter and another friend from Share in New York, somebody I never met actually and they wanted to do some jamming together on their Share evenings and that new friend had a whole set of: "okay, I go into four branch?, you go into that round, Eric goes into that branch, and you go into this", and it really turned me off, it was too rigid, and then it's better to say, okay today we play with Quick-time VRs, that's alright but then the actual manipulation, I really need to go from here to there, and somebody brings something in and needs to react to that, I have to be much more free.

SD: So they were imposing their style on you?

IJ: Not really, but he thought it might be a good way to stay out of each others way like that. Each of us had a layer, so we didn't disturb each other more or less, whereas I like to be disturbed and it's boring if I'm by myself all the time in my layer. That was interesting. So then I wrote this much to them: 'we'd be limiting too much' and then we didn't do it, and it was fine.

SD: So in other words, you entered into the session in a more free way; you didn't do it as he wanted?

IJ: Yeah, I said I find it much too limiting. Then we just entered the session, and because we didn't know each other, we never played together. So you bring in this old friend, and then you all start working and then you take it from there.

...

SD: Is there ever a narrative element that occurs...?

IJ: Yeah, I mean, there can be, but for DEAF [...] I thought there were tons of stories in that! They would just come and go, but there were tons of stories there. It was great, it was the story of us really doing *that* story, from images and stories, from memories. Everything. It just blew through. It did, yes.

...

SD: in *'Interfacing Realities,'* you and Michelle devised a [...] strictly structured improvisation. Obviously it still leaves the door open for unpredictability but in a different way.

IJ: Yes, the media, with the Google image search [...] People came in and gave keywords. Then you don't know how your partner will feel, and if she's also in a creative downpour, and you get that in, that was fantastic! That was actually very, very successful. That was the most successful session I've ever had, I think.

Arjen Keesmaat (NL):

SD: So before you are going to work with somebody, do you usually structure the approach ahead of time or not?

AK: Well, in the Radiotopia performance we actually did that, to be safe, but last time I was performing with Isabelle, we decided not to structure anything. We're both in favour of using many texts, and some abstract geographic figures, but otherwise completely generative and general, not structured at all.

SD: How are you influenced by the choices of the people you are playing with?

AK: Well, it's collaboration, usually jamming, improvising. It's a constant action-reaction and the nice thing is that you might react on something that someone else did but in the meantime the other person does the same so that's changing. Changes are revolving around each other which can be really surprising. It also depends on the pace sometimes. If the other person doesn't do so much sometimes for five minutes, maybe she went to the toilet, so then it's like building up your own stuff, and then all of a sudden they start to change stuff again, so I think it's a real play of action and reaction.

SD: How do you reach a synergetic dynamic, and how long does it take on average to build that synergetic dynamic?

AK: Through what means? Process?

SD: Well, yes, when you are in a session. Is there any technique that you have to reach that kind of state in a session where you really completely feel that collusion?

AK: That's an interesting question. Well, in terms of how long it would take to reach it, I think it is really hard to tell, but for me, when I start to feel that it's going to happen, is for instance, when I make something, maybe as a reaction on something else, and then I'm just watching the outcome, watching if anything happens for a while.

SD: And you would describe that as a really synergetic moment, like jazz musicians when they really appear to be grooving?

AK: Well, that's what I mean, when I look at the outcome for a while, and then I start to like it, and then maybe meanwhile, the other person is changing some parameters, or just adding or deleting some stuff. Once the outcome starts to improve then I start to feel there is this synergetic -how do you call it?

SD: Dynamic?

AK: Dynamic, yeah [...] But also, for instance, in decisions, it can even be a joint decision, you know, deleting some modules from which we decide that this is not the way we want to go or it is too complicated and then we start with a really, really basic thing again that might even be beautiful already. Especially when it is a joint decision.

Lodewijk Loos (NL):

SD: [regarding his partnering with Eric Redlinger for the DEAF03 performance] How much time did you put into rehearsals or preparations for that piece?

LL: Yeah, very little, because, when it's a live performance, I think the idea of the performance is that everything that happens is growing during the performance and you start with nothing and I think that...

SD: You really started with nothing, you didn't have any media?

LL: Well, almost. We tried some things out, but those performances, the

concepts I think came from Michelle and the concept was to produce the webcrawler and text. Those were two very simple inputs and of course the imagecrawler is very suitable to use for live things because of how can you prepare using that. Maybe you can try out some words that give nice results but it's very handy to use for a live performance because it keeps on running and things are coming out of it and you don't have to really do much with them but because the concept was to use that one and the text which is also very live at the moment,

SD: The sms inputs from the audience?

LL: Yes, that also we didn't have to prepare much

SD: How aware were you of the audience, the presence of the audience, and how they might be perceiving what you were doing? Were you aware of them at all or were you just so concentrated in what you were doing with Eric?

LL: Yes, sometimes they were asking questions, because they wanted to know what was happening, which is very important for them to know because sometimes they're a bit disappointed in the outcome because they see so many computers and then they think there are 10 people involved, and what I see is this? How is this possible? So I had to give some explanations once in a while and then Eric was just taking care of the output and...

SD: Did you tell him, did he know in some sort of way that you were busy answering questions?

LL: No.

SD: He could just tell you weren't changing anything or not giving any input so he figured...?

LL: Yeah, I guess so. I don't know if he really noticed it but, then in the beginning I was a bit nervous, because there are people walking around but once you're getting started you're being sucked into it and then time flies and you're just busy like hell, clicking and dragging, and then you forget about everything else, and also problems are... all sort of simple things like: "why am I not seeing this layer" and then you have to debug it and

think really hard and so it keeps you so busy that you don't have free attention for things around you.

SD: And sometimes, like you said, you were answering questions. Could you feel the audience there? Was it different from when you were rehearsing? Or being in an empty room if you and Eric were performing as a kind of test-session?

LL: Hmmm, no, when you're really very concentrated patching, I don't notice them at all, they're gone [...] But it's also when a problem arises, like something crashes, and then you start to think: "oh my god, everybody is looking at the screen and it's blue" and [...] then I get a bit nervous.

SD: If something goes wrong, you're aware but when things are going smoothly and you're doing your work, you're not aware?

LL: Yes, that's like it.

SD: So would you describe that as being in a kind of zone? You arrive in a kind of space where your concentration is so full, so focused on the patcher and the thing you're making, that everything else is just blocked out or dimmed, or fading?

LL: Yes. That's exactly it, I think.

Part Three: Catalytic Interplay, Composition and the Affective Interval

*Art as an autonomous process of bringing an enveloping self-variation into its own truly singular expression is a catalytic fusion. Catalysis involves resituating variation - a very different proposition from contextualizing things. Klee calls this "composition" in contradistinction to "construction." Composition is less a critical thought project than an integrally experienced emergence. It's a creative event [...] **It's the openness of closed form, form continually running into and out of other dimensions of existence [...]** Neither reducible to or separable from any given situation: **non-locality**. The nonlocal relationality, the integrality of the creative event is virtual. Only the terms of the relation are actual. (Massumi, 2002a,174-175)*

Introduction

Massumi's description of art as catalytic fusion is so apt for describing KeyWorx performances that there is a temptation to begin and end there; in the nonthere interval of nonlocal relationality; in the translocal distribution of sensation through indeterminate composition. But there is a history to be explored in the performing arts that complicates and indeed corroborates the elegant fuzziness of the creative event; the nonlocal, relational rupture of meaning that exponentialises the absence of locality in KeyWorx-style performance practice.

This section concludes the thread of creative thought, partitioned thus far into three domains - philosophy, science and art. The artistic focus is on live, improvised performance, augmented with new media technologies. This narrowed focus is implicitly inclusive of a transversal interdisciplinarity that adds to its underlying complexity. The expression of performative composing fuses with an autopoietic openness, a topological shifting, a transformative out-of-phasesness. The art of collective composing entails a polyrhythmic, co-operative group effort. It is socially and functionally limited by conventional and technical protocols. As interplay, it moves through intuition and intuition through it in the making of the event. Intuition, as a thought process, is co-extensive to the concept, the function and the percept/affect.

Chapter Five

The Artistic Percept/Affect: Sensational Spontaneity

Composition is the sole definition of art. Composition is aesthetic, and what is not composed is not a work of art. However, technical composition, the work of the material that often calls on science (mathematics, physics, chemistry, anatomy), is not to be confused with aesthetic composition, which is the work of sensation. (Deleuze & Guattari, 1994, 191-2)

*Indeterminacy is not a game or a passing fancy. It is **the** philosophical challenge to the aesthetics, art and ego of history. (Cope, 1976, 169)*

There is no acknowledged general theory of improvisation, only a long-standing debate regarding the compositional attitude of choice, chance, spontaneity and indeterminacy. Detailed perspectives on improvisational methods can be found but, as a form of practice, it persistently resists representation. As practice it is irreducible to its process. Massumi's insight on art as a catalytic fusion, an integrally experienced emergence, assumes a heightened and more potent significance when situated in the multiplicity of collective composition. If the process of making is "too impossibly overfull" to be actual, if it resides in nonlocal virtual dimensionality, then how is it possible to distinguish the distributed, synchronous, collaborative effort of networked composition? This process certainly compounds the intensity of the catalytic event, the experience of composing - exponentially. Nonlocal relationality, in this instance, is literal. The actual relations are the protagonists themselves, humans and computers and the transductive artefacts of their interactions. Here is a contemporary, posthuman collectivity, evoking of the interplay of transversal emergence. Bruno Latour has said that: "If anything, the modern collective is one in which the relations of humans and nonhumans are so intimate, the transactions so many, the mediations so convoluted that there is no plausible sense in which artifact, corporate body, and subject can be distinguished" (1999). When a group of artists convenes to create a dynamic artefact, a processual composition, often in collusion with a public, there is no differentiating the terms of the actualised relations. What is produced is nonlocal, or *translocal*, relationality. What is perceived is an interstitial play of forces. An affective interval of internal polyrhythmic resonance. The temporal transduction of domains felt in the virtual, incorporeal space of a distributed, collective body.

Those that participate in an improvisatory compositional method generally do so because of an insistence on unpredictable interaction. The output is the by-product of the process. There is an interdisciplinary cachet to real time media improvisation

that is rebellious, interventionist, anti-capitalist (in its lack of commercial commodity) and anti-conservative (with respect to documentation).¹⁰⁰ There is a reflexive purity in the “theory” of improvisation to its practice - a real time, self-referential flow that cuts and splices prefigured connotations; displaces the semiotics of expression and ruptures all teleological inclinations. Translocal composing *is* nonlocal relationality. It is often, depending on its protocols, a non-hierarchical, de-centred living system of emergent behaviours and properties. Its dynamic cannot be captured. It is a felt relation, immanent to the incorporeal body; affect as a synaesthetic dimension distributed through the network of the Internet.

There are several pertinent questions and relations that need to be established before granulating the ontogenesis of composing. What is the relationship between improvisation and play? Is the computer a toy-like object in the processual game-play as well as an actor? Does play necessarily incorporate intuition? Is interplay immanently compositional? To what extent is the process indeterminate? What is the role of choice (free will)? Of chance?

In *Thinking in Jazz* (1994), Paul Berliner asserts that one can only explore improvisation through its practice: “For there is no general or widely held theory of improvisation and I would have thought it self-evident that improvisation has no existence outside of its practice” (1994, x). Marshall Soules claims in his essay “Improvising Character: Jazz, the Actor, and Protocols of Improvisation” that: “The complex negotiation of identity within a performance context - whether the art be music, acting, writing, or the performance of self in everyday life (Goffman, 1959) - pits individual freedoms against the constraints and opportunities of society” (2001,1). This simultaneous, nonlinear fracture and connection between self-identity and society, the individual and the collective, extends the “center of indetermination.” That complex, virtual assemblage of thought and sensation becomes a shared field of potential. Soules’ pitting of individual freedoms against societal constraints surely exposes a liberal humanist tendency in a terrain that better lends itself to the articulation of collective individuation. Adding machines to the intersubjective “becoming-transversal” mix further complicates things.

The digital envelope does not describe the virtual. The ‘matter’ of the living organism does. The digital is associated with the quantifiable, with the actual. The analogue is the stuff of the virtual, the qualitative stuff of life. With the technologically enabled digital meld of temporal dimensions and variable speeds that complement human-human interaction today, there is certainly a transform from individual to transindividual. It is here that Gilbert Simondon’s concept of technicity joins the

relational contingency of our story.

Technicity [...] refers to a transductive dimension of technical objects that are not 'objects' at all but ontogenetic processes that move from the abstract to the concrete, from the virtual to the actual. (Mackenzie, 2003, 16)

And what is a transductive dimension? According to Mackenzie, it "promises a more nuanced grasp of how living and non-living processes differentiate and develop. It understands the emergence of a mode of unity without presuming underlying substance or identity. Every transduction is an individuation in process" (2002, 147). Transduction exerts a potential for intuitive processes to transversally intersect with machines in the composing process.

Re-establishing the Concepts

Concept 1: *The interplay of creative thought in the relational event dimension of translocal, polyrhythmic composition is intuitive. The aesthetics are transversally emergent.*

Concept 2: *Affect, through a process of individuation, is transductively distributed in translocal, polyrhythmic composition. The 'space' of affectivity must be quasi-corporeal, indeterminate and proprioceptive; internally resonate, externally vibrant.*

Concept 3: *Intuition is transductively individuated in translocal, polyrhythmic, real time - la durée - composition. Variations of intuitive elements - problematising, differentiating and temporalising are intuitively (recursively, autopoietically) immanent to la durée composition (jamming).*

These concepts are based on an empirical intuition that KeyWorx practice presents an example of compositional processes that are collectively individuated and distributed. It confounds a presence/absence paradigm with a pattern/randomness paradigm that Katherine Hayles proffered in *How We Became Posthuman* (1999). It directly addresses the rhythmic, indeterminate dance on the edge of chaos in compositional practice.

The theoretical musings that underpin multiplayer improvisation as transductively intuitive have been established through descriptions of modes and methods from philosophy and science that, in their respective ways, postulate an element of crea-

tivity and freedom in intuition, in microidentity breakdowns, and in the readiness potential between brain stimulus and consciousness. How are these creative processes applicable to the arts, and more to the point, applicable within the technicity of the performative new media arts? Deleuze and Guattari claim that artistic production is driven by the percept/affect:

Percepts are no longer perception; they are independent of a state of those who experience them. Affects are no longer feelings or affections; they go beyond the strength of those who undergo them. Sensations, percepts and affects are *beings* whose validity lies in themselves and exceeds any lived. (1994, 164)

With percepts, affects and sensations as independent *beings*, distinct from the producing subject, they could be seen to distribute themselves. The quasi-corporeal 'material' of their construction is unimportant; they can be preserved, for instance, in the ephemera of a passing sound. Deleuze and Guattari outline varieties of compounded sensation. *Vibrations* are simple compounds of constitutive differences of level; the *embrace* involves two sensations tightly resonating in a clinch; *withdrawal*, *division* takes place when two sensations move apart, *distend*, so as "to be brought together by the light, the air, the void that sinks between them or into them..." (1994, 168). Together they comprise: "Vibrating sensation - coupling sensation - opening or splitting, hollowing out sensation" (Ibid). Percepts, affects and sensations are beings that exceed their livingness. Deleuze and Guattari describe affect as art passing from the material (whatever material) to the sensation to reside on zones of indetermination (173). "The artist is always adding new varieties to the world. Beings of sensation are varieties, just as the concept's beings are variations, and the function's beings are variables" (175).

Percepts, affects and sensations are now disembodied beings in their own right and yet they are autopoietically self-referenced in the zone of indetermination; feedback into the process of making. This designation works in what Deleuze and Guattari call the *monument*, where it is conserved. This conservation is just as effective in our context of live group composing in which *affect* is "felt thought" (Massumi) that moves both inside and outside the producing subject. Affect carries a nonhuman, autonomous beingness. Its resonant echo may well be a unity that vibrates independently of the walls (corporeal boundaries) it careens off. Yet the socially situated composing that releases these autonomous beings is analogous, in many respects, to Luhmann's calling communication the life of a social system at the "expense" of the living observers that people it. In-incorporating transduction as a

process of individuating percepts and affects, inside and outside bodies, advances the possibility of having it both ways – “the emergence of a mode of unity without presuming underlying substance or identity.”

Play Theory

Group compositional processes bridge improvisational practice in music, dance, theater, games and LiveArt. Soules has concluded “that improvisation for performance involves a voluntary discipline when individuals come together to devise rules for their play, in an open-ended arrangement allowing individual expression within the ensemble of players (2001, 6). So what then is collaborative ‘play’?

The field of play and game theory has taken on new, vital and nearly hysterical momentum in the beginning of the 21st century, as gaming culture, particularly in the United States and Western Europe, is eclipsing other forms of entertainment. Online games that offer everything from puzzles to zero-sum shoot-em-ups to collective, social construction strategies (MMORPG’s, Massively Multiple Online Role Playing Games)¹⁰¹ are being played and absorbed in record numbers. Game theory is tangentially discussed in this thesis as a means of arriving at a quotidian example of the methodological role of intuition. But the nature of play and its emphasis on spontaneity and collective sensibility (sensation) is compatible with collaborative, compositional methods in the performing arts. *Play*, as an attractor in collective composition, begets the dynamic constituents of *interplay*.

Boyd and Copeau: An unusual suspect in play theory literature is Neva L. Boyd, a sociologist who developed a theory of play during the 1920’s at Hull House in Chicago. She was, apparently, influenced by Bergson and Jacques Copeau. Copeau was an actor who revived improvisation as a technique of self-reflexive awareness, calling it “the *art* of improvisation and the illusion of spontaneity” (Soules, 2001).¹⁰² A co-founder with Andre Gide and Antonin Artaud of the *Nouvelle Revue Francaise*, Copeau was looking for a non-gesticulatory form of acting that used the whole body; what later became known as “corporeal mime.” He eliminated the props and the stage, “the scenery and the furniture of traditional European theater” and sought a language that came from the “the center of being” (Schwartz, 1992, 99). His elicitation of spontaneity as “illusionary” is visionary if compared with neuroscientist Libet’s later conclusion that consciousness backdates the event, as an “illusion,” so “experience” feels to be temporally simultaneous (Libet, 1979). This also concurs with the more recent research of Haggard, et al (2002) and Eagleman and Holcombe (2002) that finds “timing judgments are always made retrospectively.”

Boyd was not a prolific writer, preferring fieldwork. She is not often cited as a mover and shaker in games theory, but her influence has had many long-term consequences; a butterfly effect. Though she never credited the influence of Bergson in her work, the language she uses to describe *play* is clearly derivative. It also mirrors Varela's later conclusions regarding the creative potential of microidentity breakdowns:

Playing a game is psychologically *different in degree but not different in kind* from dramatic acting. The ability to create a situation imaginatively and to play a role in it is a tremendous experience, a sort of vacation from one's everyday self and the routine of everyday living. We observe that this psychological freedom creates a condition in which strain and conflict are dissolved and *potentialities* released in the spontaneous efforts to meet the demands of the situation. (Boyd, "Play. a Unique Discipline" In: Spolin, 1999)

Spolin: Though Boyd's work is now categorised as recreational therapy, she is a precursor to research on the experience of improvisation and had a significant influence on Viola Spolin who worked with her at Hull House. Spolin's early work on improvisation theory for the theater through game structures continues to be seminal to the art.¹⁰³ With her reliance on intuition as the thoughtful mode of creativity, her views draw on Copeau's ideas of "spontaneity" as practice:

The intuitive can only respond in immediacy - right now. It comes bearing its gifts in the moment of spontaneity, the moment when we are freed to relate and act, involving ourselves in the moving, changing world around us. Through spontaneity we are reformed into ourselves [...] Spontaneity is the moment of personal freedom when we are faced with a reality and see it, explore it and act accordingly. (Spolin, 1999, 4)

For Spolin the participating player-actors must mutually accept the rules of play. Once accepted the improvisation becomes one of solving the problems posed by the game. "The energy released to solve the problem, being restricted by the rules of the game and bound by group decision, creates an explosion - or spontaneity - and as is the nature of explosions, everything is torn apart, rearranged, unblocked. The ear alerts the feet, and the eye throws the ball" (Spolin, 1999, 6). The intuitive physicality of the body is one of synaesthetically mixed modalities. The energy explosion, the emergent potential of the event, is physically felt - it is a sensation of the body, a felt-thought, a diagrammatic/biogrammatic functioning (Chapter Six); the "physical is known, and through it we may find our way to the unknown, *the*

intuitive" (1999, 7 emphasis added).

Huizinga: The embodied playfulness of Copeau, Boyd and Spolin, though bound by the constraints of the game, let loose an "explosion" of unpredictability. One feels indeterminacy, and the body as a centre of indeterminacy, to be integral to their scheme. For Johan Huizinga, a Dutch contemporary of Boyd, *play* is a cultural imperative, its social significance, vital. Though Huizinga felt that play "is in fact freedom," his overarching determinism colored its limits. Huizinga claimed play to be "older than culture", cutting a deep distinction between play and "ordinary life". Play as "ludic function" is a form of ritual. For Huizinga all culture was rooted in play and its effects were described by the aesthetics of his day with terms such as tension, poise, variation, contrast, solution and resolution:

[...] play [...] creates order, is order. Into an imperfect world and into the confusion of life it brings a temporary, a limited perfection [...] The profound affinity between play and order is perhaps the reason why play, as we noted in passing, seems to lie to such a large extent in the field of aesthetics. Play has a tendency to be beautiful. It may be that this aesthetic factor is identical with the impulse to *create* orderly form, which animates play in all its aspects. (1938, 10)

In the early years of the twentieth century a global divide emerged, straddled by Copeau, in which play is alternatively represented by the aesthetics of order (Europe) and the aesthetics of effective chaos - out-of-control (North America). This divide surfaces mid-century in the debate over aléatoric and indeterminate music composition (Cope, 1976). It appears in the late 60's and 70's in the collaborative erosion between avant-garde "free improvisation" and "free jazz" (Lewis, 2004). Strikingly, it reappears in the conclusions of Deleuze and Guattari at the end of the century, raising questions and eyebrows as to what shifts the new millennium might bring.

Huizinga offers several essential qualities of play, but it is the quality of the limitations of time and space that resonate with this study. Though play has a beginning and an end, while it progresses "all is movement, change, alternation, succession, association, separation" (Huizinga, 1938, 9). In a turn prefiguring Deleuze in his use of the term "refrain" to mark a space (territorialise, deterritorialise, reterritorialise) by a comforting repetition, by a middle passage:

In this faculty of repetition lies one of the most essential qualities of play. It

holds good not only in play as a whole but also of its inner structure. In nearly all the higher forms of play the elements of repetition and alternation (as in the *refrain*), are like the warp and woof of a fabric. (Ibid, 10)

Turner: Well-known for his theories of play, anthropologist Victor Turner's notion of ritual and "normative *communitas*" a time when "individuals come together and devise rules for themselves" (1986, 44) are useful markers for an understanding of the social ecology of play and its protocols; for understanding degrees of freedom in multi-maker composition.

Play does not fit in anywhere in particular; it is transient and is recalcitrant to localization, to placement, to fixation--a joker in the neuroanthropological act [...] a liminal or liminoid mode, essentially interstitial, betwixt-and-between all standard taxonomic modes, essentially 'elusive'. (Turner, 1986, 167).

Yet another reference to an enigmatic in-between; to a virtual interstitial gap so felt, so there and not there; so nonlocal, so incorporeally material. Turner links his anti-structuralist *communitas*, to a creative, liminal potential that is the margin or edge in which the arts often finds itself. He has argued that we mix what we have at hand (indicative function), with what could be—(subjunctive, or provisional function) during play (1982, 28). He has suggested that the limbic system acts as a sensitizing interface to these playful functions (1983, 167) as has Edward Hall: "Seated in the old mammalian brain, improvisation is a process originating in play in mammals [...] With these new types of animals, a new brain evolved, a horseshoe shaped structure called the limbic system [...] the centre of emotions, parenting, social organization and play." (Hall, 1992 In: Soules, 2001). Composer Pauline Oliveros imagines a quantum leap beyond the limbic in the evolving future of improvisation:

By analogy or metaphor Quantum Improvisation could mean a leap into new and ambiguous consciousness opening a new variety of choices. Ambiguous consciousness would mean the ability to perform in more than one mental state simultaneously in order to reach or bridge past and future as an expanding present. There could be new sound combinations anchored by increasing order even though choices might seem incompatible. Such a quantum leap could mean the utilization of more of the neocortex, the seat of creativity and problem solving. The newest part of the brain that is waiting to evolve in association with the limbic system - the amygdala - old brain and

seat of the emotions. Quantum Improvisation could find new ways to express and understand the relationships between mind and matter. (1999)

From a complementary perspective, neurophysiologist Richard E. Cytowic, a synaesthesia researcher, provokes a similar equation:

The limbic brain's use of common structures for different functions such as memory, emotion, and attention may partly explain why humans excel at making decisions based on incomplete information, "acting on our hunches." We know more than we think we know. And yet are we not always surprised at our insights, inspirations, and creativity? (1995)

Though an argument could be made that our brains are always already engaged in a co-extensive past and future, these ideas speak to an evolutionary trajectory and are furthered by Deleuze and Guattari's exteriorising the brain as it materially interconnects dimensional planes. The exteriorising of thought is compatible with ideas of collective consciousness and shared affectivity through distributed composition. For Deleuze and Guattari, thought extends well beyond the mammalian brain.

Protocols of Posthuman Interplay

Through this gloss of play theory and its relation to rule-based power structures and intuition, the translocal event cryptically vibrates between the nonlocal and the translocal as the protocols of play are subtended by the protocols of the network. Consider Alex Galloway's explanation that "Protocol is a language that regulates flow, directs netspace, codes relationships, and connects lifeforms. It is the etiquette for autonomous agents" (2003, 11). These coded protocols that enable interoperability between computer chips, underlie another set that figure in the process of group improvisation. Soules writes:

Protocols--"long-established codes" determining "precedence and precisely correct procedure"--may at first seem antithetical to popular notions of improvised creativity. However, interdisciplinary research into the nature of improvisation shows that *it typically occurs either within, or in close relation to, voluntary constraints*. (25, emphasis added)

The translated interplay between human players and their machines is well-tread ground. Opening that field of discourse to 'real time' collective participation is still

a relatively obscure topic in terms of practical examples and case studies. It is best documented in online gaming role-playing rituals in strategic playgrounds. Adrian Mackenzie has linked Giorgio Agamben's concept of the *whatever* (1993, 1-2) to "a collective belonging-together" which doesn't presume a substantial or essential unity (2002, 147). Massumi has done the same in his reworking of the quasi-subject in Serres' football match (2002).¹⁰⁴ Mackenzie renegotiates Agamben's transit from ontology to ethics as one from bodies to images in computer games. "These images are located in time; the time lost in play and conceived neither objectively nor as a predicate of human subjects or cultures" (2002, 148). The collective singularity engendered by computer games and by extension, KeyWorx-like compositional models, is what Simondon might call the *transindividual*. Mackenzie, after Agamben analyses play in computer games, not from a vantage point of deconstructed coding and narrativity, but from a coexistent temporality of past and present resonant with a Deleuzian event in a Bergsonian duration.

There is a powerful double nexus between play and temporality [...] the history of games shows that play emerges from ritual and ritual is deeply interwoven with time and history in the social formations it belongs to [...] *play entails a loss of ordered time*, or a breakdown of the time of the sacred. *Play transforms structures into events*. (Mackenzie, 2002, 150 emphasis added)

Event singularities (differences) are descriptions of the *whatever* body, the *preindividual*, the contingent relation, the "not-yet-or-never-ever-identity". "Indeterminacy and deep contingency consist in a reserve of preindividuation, or a constitutional openness that triggers becomings, invention and indeed play itself " (Ibid, 153). This might be thought of as indeterminate interplay in a field of event-potential. But collective play as a cultural transduction necessarily oscillates between structure (the synchronic) and event (the diachronic), between quantitative clock-time and qualitative duration. Mackenzie has suggested:

It remains to be thought however, what manner of singularity can inhabit the staging of coincidences between events and structures. If there is play (in the sense that Agamben describes as the manipulation of the human temporality materialized in objects) in computer games, then it is play that somehow must diverge from the economic transformation of events and structures [...] The question then is thus, How can there be play when the structures involved are already explicitly organized as buffers for indeterminacy? (2002, 168)

This is the “through the back door” deterministic codification of the indeterminate. It delimits a conundrum analogous to the pervasive *pseudo*-random number generators that randomise functions in most computer programs.¹⁰⁵ How can emergence emerge if the terms of the relation are a priori fixed? How does the transform from structure to event occur? Massumi provides a thesis: “The phase-shift of the substantial to the potential is the opening through which emergent contingency – the intermixing of already constituted bodies, things and signs – expresses itself as coordinated becoming. This *expression* is the effective condition of collective change (open-ended belonging)” (2002a, 77).

A solution space in computer-mediated play may simply point to open architectures in distributed compositional applications. In a digital playing field, the play object or ‘toy’ is the computer itself and/or the digital artefact. The data structures that underlie the game complicate any indeterminate potential as limits are fixed by that same code. The procedural ‘rules’ cannot be creatively sidestepped or broken without stopping or crashing the play. Here is the “coordinated becoming”, the phase-shift between structure and event, expressed in the interplay.

KeyWorx and other forms of translocal webjams, though they share many of the same parameters and limits of multi-player online games, differ in specific ways. The rule-based protocols-of-play are generated for every encounter by the players from a blank slate, a neutral interface. These protocols are subtended by the limits of the procedural code, the bandwidth, available CPU, machine speed, etc., etc. The computer functions as a non-human player with a digital toolbox of potential algorithmic processes. Individual media objects (images, sounds, text, data) are uploaded, processed, generated and analysed. These artefacts are incorporated into the “transvergent” (Novak, 2002) system by the player/artists.¹⁰⁶ They do not preexist in the software. They are expressed in the system as they are enfolded and unfolded through the collective processing of the players and their machines. The question of buffered indeterminacy remains relevant yet is distilled by the sheer complexity of potential interaction.

Improvising with the Avant-garde

Music critic, Charles Fox, once said of jazz that “the unexpected suddenly becomes transformed into the inevitable” (Collier, 1975, 87). Again, that stamp of the indeterminate, the representation, in the flux of the unpredictable. Yet this statement taps into a continuity, the sensation of future-past contingency, the paradox of the

co-extensive loop between the determinate and the indeterminate. It is interesting, in the context of improvised performance, as it comes from a passive participant, a spectator. One of the prevailing characteristics of improvisatory jamming is the dynamic interaction, the performativity, between the players and the relations between them.¹⁰⁷ To improvise is to hone the ability to access, together, the multiple dimensions of duration, through intuition; to ride the singularities of bifurcating contingency, select without intellectualising, tap the world “glue” of affect (Masumi, 2002a, 227). “The kind of deep interpersonal connection that can occur in the process of creating improvised music with others is about “being” and “becoming” together” (Burrows, 2004, 14). The intensity (sensation) of interaction, when improvisers are in a shared “zone,” is difficult to describe. Those who have experienced this intensity, often intuitively understand the passage through a “zone of indetermination.” They reflexively intuit an in-formed, in-corporeal centre that “operates by filtering information directly” (Hansen, 2004, 10). The percepts and affects of the composing are distributed such that spectators share sensation through a transductive process, tapping the passage of multiple durations. Bergson describes sitting by the edge of a stream and being simultaneously aware of the passing currents, of a birds flight overhead, of the beating of his heart, of a train’s whistle. To repeat Deleuze again as a refrain:

Intuition is not itself duration but rather 'the movement by which we emerge from our own duration' and 'make use of our own duration to affirm [...] and recognize the existence of other durations'... (1991, 38)

The sensitivity to multiple dimensions and pluralities of meaning is a performative element in any live presentation. It is essential in freely improvised, collective composition. For Ornette Coleman, the protocols of improvising were geared towards the players. Of the *Free Jazz* recording he said: “The most important thing [...] was for us to play together, all at the same time, without getting in each other’s way, and also to have enough room for each player to ad lib alone - and to follow this idea for the duration of the album” (Soules, 2001). Ethnomusicologist John Miller Chernoff claims that *style* is “another word for the perception of relationships, a dynamic aesthetic attitude which focuses the music on the occasion” (1979). The “occasion” is the situatedness of the enacted event and is sensitive to a certain set of social protocols in which the creative event is embedded. Massumi concurs when depicting *style* in sport: “The “individuality” of the *style* is a collective individuation: “collective” in its absolute dependence on an intermixing of the multiple and heterogeneous elements of the sport ...” (2002,78). This relational perspective of aesthetics is paramount. Rule-sets and protocols are important in providing

structure for style to emerge but equally important are the social constraints, the trust and sense of responsibility to the composing group that actualises the potential-to-artefact. "The star is the one who most effectively melds with the collectivity, towards its becoming. That becoming is inextricably aesthetic (stylistic) and ontological (emergent)" (Ibid). Reciprocity invigorates individuation and stylised artistry. Chernoff's description of traditional West African drumming prefigures a collaborative aesthetic and "protocologic" (Galloway, 2003) of the fledgling practice of translocal jamming:

Rhythmic dialogues are reciprocal, and in a way that might seem paradoxical to a Westerner, a good drummer restrains himself from emphasizing his rhythm *in order that he may be heard better* [...] a rhythm is interesting in terms of its potential to be affected by other rhythms. (1979, 60)

This depicts the polyrhythmic refrain of free improvisation, the comfort zone of belonging-together when the stakes are raised. But these allusions are in no way simply diagrammed. The complexity of protocological styling with regard to methods of group improvisation has generated an ironic, cataclysmic, cultural divide between Europe and North America. Within the avant-garde music 'tradition,' high-culture and jazz-related, the willful force to push beyond respective idioms is often characterised by improvisatory play. The contingent and the marginal draw heat - and controversy. This cultural schism will be framed by two versions of a transcontinental tiff inherent to the ethics and methods of improvisation. The tendencies expressed here are so filled with paradox that they contrive a normative condition.

1. Free Jazz/Free Improvisation

"Man, there's no boundary line to art." Charlie Parker

Differences between the European jazz avant-garde's "free improvisation"¹⁰⁸ movement and the "free jazz" African-American movement, a distinction George Lewis calls "Eurological" and "Afrological" (2004, 1), focus on the role of the individual in the collective process. In his thoughtful dissection of the rift initiated in the early 70's between first generation European free improvisers and second generation African-American free jazz improvisers, Lewis deconstructs the historical, social and political conditions that framed 1) the soloist in the ensemble and 2) the composer in the composition. In sum, Lewis unrolls the historical frictions between the "two avant-gardes" that represent the African-American heritage of jazz improvisation and its pan-European by-product. Lewis quotes German critic Joachim Ernst Berendt: "European jazz is - also in its emphasis - a collective jazz, in which the indi-

vidual proceeds from the ensemble" (6). Lewis adds:

This affirmation of the importance of collectivity was seen as part of the European transition away from an American-centered "free jazz" that, for Berendt in 1976, exemplified a preoccupation with singular heroic figures: "Whoever reflects upon the high points in European jazz in recent years always thinks of the collective. Whoever thinks about high points in American jazz of the 1960s, then as now, thinks of great individuals: Cecil Taylor, Pharoah Sanders, Ornette Coleman [...]" (Berendt, *Das Jazzbuch* 371 In: Lewis, 2004, 15).

Rigourously unpacking the complex scenario in which the schism between methodologies and aesthetics brewed, Lewis defends the historical place of race and origin in the avant-garde tradition. As European improvisers were nurturing a denationalised, pan-European sensibility on a fractured continent in the 70's, they were also deeply invested in a radical disavowal of the harmonic and rhythmic conventions of high-culture avant-garde composition. Their American counterparts, second generation jazz improvisers, resided in racially segregated enclaves in cities like Chicago, and were, radically, turning towards 'original music.' This was a pivotal point in the AACM (Association for the Advancement of Creative Musicians) manifesto of 1965. As European improvisers were distancing themselves from compositional practice of high-culture (in the Boulezian idiom), the AACM was moving towards a "serious music" (8), an emancipated mobile, boundaryless artform (10).

Even as free jazz becomes a handy second (fixed) term in the binary equation, in the context of the improvisative musics that emerged from the mid-1960s, the explanatory power of both the free jazz/free improvisation and the idiomatic/non-idiomatic dialectics rests in large measure upon an erasure from the history of improvisation of the very group whose work problematizes both dialectics – the AACM. (23)

As Lewis' paper chronicles the path of rupture between the worlds, he concludes:

One might have thought that a strong case for an ongoing, vital exchange between the two avant-gardes could be made on the basis of the overlap of interests and methodologies [...] In any event, *the point here is that the absence of collaboration can express a complex mix of aesthetic, historical, and methodological positions.* (24, emphasis added)

The split between the jazz-oriented avant-gardes on two continents is mirrored in the debate between Cage and Boulez over what might be classified as high-culture improvisation.

2. *Chance and Indeterminacy*

*What if there are twelve tones in a
row? What row? This seeing of cause and effect
is not emphasized but instead one makes an
identification with what is here and now. He
40" then spoke of two qualities. Unimpededness and Inter-
penetration.
The relationship of things happening
at the same time is spontaneous
and irrepressible.
50" It is you yourself
in the form you have
that instant taken.
To stop and figure it out
takes
time. (Cage, 1961,155)*

There was an aesthetic war of wor(l)ds between European and American composers in the 1950's through the 1970's regarding the description and integrity of "chance" composition. A European contingent, with Boulez as primary spokesperson, labelled their experimental compositions with chance operations – *aléatoric* – from the French word *aléa*, for chance, risk, dice, and danger. The *aléatoric* has an implicit rule-set; a tabular strategy. The definitive differences between "chance", "*aléatoric*", "improvisatory" and "indeterminate" were and are more divisive, in many ways, than clarifying. The transcontinental battle of style in the mid-twentieth century is steeped in cultural tradition, or lack thereof. The polemics provide a diving board for jumping into deeper issues of aesthetic control mechanisms that underlie the debate. This statement from American composer William Hellerman is his personal clarification of the distinctions between the European *aléatory* and improvisation:

Improvisation is concerned with the realization in real time of defined goals. *Aléatory*, by its very nature, does not recognize the existence of goals. Both differ from the traditional "classic music" by leaving open to the performer the choice of the specific materials to be used in the piece.

They are often lumped together for this reason, and, also, because they are both thought to be “free.” Actually freedom is not really the issue. *Improvisation at its highest, seeks meaning through spontaneity. Aléatory declares meaning to be spontaneity. Both of these are very restrictive states.* (Everett, 1971 in Cope, 1976, 149 emphasis added)

Aléatoric composition, from the European perspective, enlisted elements of spontaneity. Spontaneity was generated through choice. But aléatoric methods were also concerned with controlling that spontaneity. Choice is a control function. As a compositional form, it chose not to relinquish the “composer” from the “composition.” In a letter written to Cage in 1951, Boulez complains: “The only thing, forgive me, which I am not happy with is the absolute method of chance (tossing of dice). On the contrary I believe that chance must be extremely controlled [...] there is already quite enough of the unknown” (Nattiez, 1993).

John Cage was one of the first artists to use the term *indeterminacy* to describe a compositional process. It was a term with variously rendered transdisciplinary meanings along the lines of “indistinct,” “unpredictable,” “uncertain,” “having inexact limits,” across the fields of mathematics, philosophy, biology, jurisprudence and physics. For Cage, indeterminacy in music alluded to a type of performative, compositional practice that was decidedly *not* improvisational. Indeterminacy does not render meaning, but rather, produces a framework for the performer to take responsibility independently of the composer and the composition. Throughout the 1950’s he felt that improvisational techniques relied on memory and taste and known patterns in such a way as to restrict the revelation of something new. Cage strictly delineated between compositions that used chance operations and compositions that were indeterminate. He has said of the difference between the two that *chance* “refers to the use of some sort of random procedure in the act of composition,” and *indeterminacy* “refers to the ability of a piece to be performed in substantially different ways” (Miller, 2003, 18). One of his most infamous works, *4’33*, is drawn from chance operations using the I Ching. It consists of three movements of metrically measured silence. Although not an example of indeterminate composition, the ambient sounds of the room in which the piece is performed introduce an unpredictable layer of silence as sound. Cage’s *Variations* series of eight compositions exemplify his exploration of indeterminate composition though he admitted to never fully achieving this.

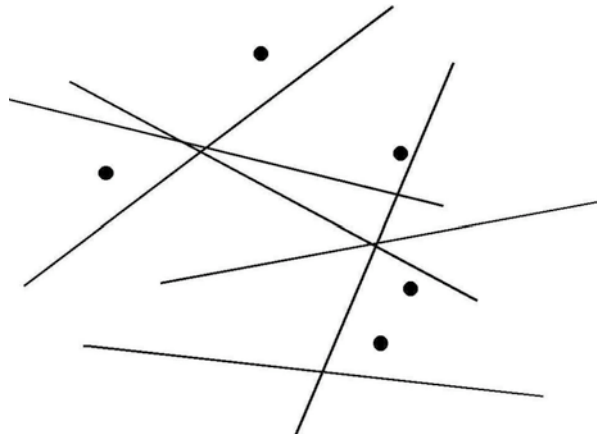


Figure 5.1 The choice of notational arrangement for Variations II, for example, will appear different in every performative instance. Above is an example from David P. Miller's analysis of the compositions procedures: "Variations II consists of six transparencies with a single line segment each, and five transparencies with a single point each. (Actually, the transparencies need to be cut apart after the score is received from the publisher.) The points are all the same size. The lines represent "1) frequency, 2) amplitude, 3) timbre, 4) duration, 5) point of occurrence in an established period of time, [and] 6) structure of event (number of sounds making up an aggregate or constellation)". [...] the medium of performance is not specified ("for any number of players and any sound producing means"). (Miller, 2003, 20)

In *Variations I* and *II*, it is the act of measuring the points and lines and their intersections, in a diagrammatic space of sound potential that actualises the score. Chance and choice are variable according to the predisposition of the performers. As Miller concludes: "By the actions of preparing the score and measuring it, the performer makes an *n*-dimensional, abstract subspace manifest in sound, or makes the inaudible audible"¹⁰⁹ (Ibid, 38). Curiously, Cage attributes a grim, machinistic flavor to the degree of control constituted in chance composition, though some of his favorite works are decidedly of that class:

[...] In the *Music of Changes*, *structure*, which is the division of the whole into parts; *method*, which is the note-to-note procedure; *form*, which is the expressive content, the morphology of the continuity; and *materials*, the sounds and silences of the composition, are all determined. Though no two performances of the *Music of Changes* will be identical [...] no two performances will resemble one another closely. Though chance operations brought about the determination of the composition, these operations are not available in its performance [...] The *Music of Changes* is an object more inhuman than human [...] The fact that these things that constitute it, though only sounds, have come together to control a human being, the performer, gives the work the alarming quality of a Frankenstein monster. (1961, 36)

By way of clarification and in a less dramatic manner, Cage has also said that: "Bringing about indeterminacy is bringing about a situation in which things would happen that are not under my control. Chance operations can guide me to a specific result..." (Campana, 1985, 109)

The willing suspension of control is indeterminacy in practice. It is a concept that catalysed the divide between Euro/American 'high'-culture avante-garde composers in the mid-20th century. Control. The hierarchical, composerly expression of control. This is something quite distinct from the bottom up, socio-protocological control of jamming. European composers, in what is certainly a generalisation, wished to retain it; to invent through construction. For a certain small American faction (Cage and Feldman in particular), the act of composing was precisely about relinquishing control. Although Cage played it both ways in that a large body of his work explored chance operations as described in the above remarks, indeterminacy was the more persuasive, the more philosophically challenging concept:

Indeterminacy implies art as process. No beginning, no middle, no end: that is, no longer will "objects" of music exist in that sense, but each new performance, each new circumstance, will create a continually variable process of ideas [...] *If art be process, then indeterminacy is the only viable way to proceed* [...] Indeterminacy philosophy must lie in a concept of disassociating man's significance as a creator, emphasizing the possibilities of man as creative performer/listener... (Cope, 1976, 169 emphasis added)

Indeterminacy in mid-20th century music composition had two vectors: composer indeterminacy (indeterminate with respect to composition, determinate with respect to performer) and performer indeterminacy (determinate with respect to composition but indeterminate with respect to performance). Cope has said of the performer indeterminacy that it "owes much of its development to the idea of "event"¹¹⁰ (Ibid, 174). That is, that the unity of the singular event and its field of potential has more significance than the procedural or linear construction of elements. Performer indeterminacy explores the quasi causality of *eventualising*. This development places an historical role on the practice of contemporary indeterminate, collaborative composition that views itself as event-based rather than narratological or dramaturgical.

There is of course a third type of composition that emerged in the 1950's that is indeterminate for both composer and performer. There is no score and there are no

fixed materials. There is generally, no beginning or ending - only constraints from the composer and the situatedness of the performance. An early somewhat dramatic example might be Nam June Paik's first performance of *Homage to John Cage* (1959) in which he leapt from the stage to Cage's seat, slashed his shirt, poured a bottle of shampoo on his head, snipped off his tie and left the building telephoning the audience later that the piece was finished. (Cope, 1976, 181). Contemporary jamming techniques that use real time search engines modifications to troll the Internet for content during the performance are recent examples of this form indeterminacy in practice. The form of the content and the form of expression are indistinguishable in the event of diagrammatic process.

Cage eventually softened to the idea of improvisation and coined the term "structural improvisation" which provided a means of situating performers so that they would be in unfamiliar territory, unable to rely upon style or memory or taste. Structural improvisation can be placed in the fluid context of systems theory. The absence of *style*, important to Cage, resembles the star style of Massumi in its openness to emergent, collective individuation. Cage said:

What delights me in this thing [...] is that the performer, the improviser, and the listener too are discovering the nature of the structure [...] Improvisation [...] that is to say *not thinking*, not using chance operations, just letting the sound be, in the space, in order that the space can be differentiated from the next space which won't have that sound in it. (Feisst, 2002, emphasis added)¹¹

"Not thinking." That could be the beginner's mind of Zen philosophy so influential to Cage. It could also be intuition.

3. *Chance/choice and contingency*

"Improvisation enjoys the curious distinction of both being the most widely practiced of all musical activities and the least acknowledged and understood...Improvisation is always changing and adjusting, never fixed, too elusive for analysis and precise description, essentially non-academic..." Derek Bailey

Across the Atlantic, composers such as Boulez, Lutoslawski and Evangelisti were irritated with the American model of indeterminacy. That irritation was focused on what they viewed as an abandonment of decisiveness, of choice-making. This was not composition. Though they did concur with Cage in their suspicion of improvisation, particularly 'free' improvisation, they preferred "controlled chance". *Control* is in this instance, *choice*.

This view of chance 'aesthetics' is obviated by the 'European' view expressed by Boulez. In an interview, he was asked if he viewed chance the same way as Cage. He responded "No, not at all. I find that so highly unproductive because 'chance' is not an aesthetic category. "Chance can bring something interesting only one time in a million [...] Most of the time you do not get that one time [...] and, if you do get it, you get it in the midst of a hundred thousand possibilities which are not interesting. (Cope, 1976, 170)

For composers on both sides of the Atlantic, in the formative years of compositionally situated chance operations, there was little inclination to extract the composer from the composition, whether aléatoric or indeterminate. Ownership of the concept was never questioned, no matter how distributed the process of creation. The slow yet steady infiltration of systems, catastrophe, chaos and complexity theories into arts practice has changed things. Non-hierarchical, de-centred approaches to contingent processes of making, experiment with the extraction of the choreographer from the choreography, the director from the play, the composer from the composition, the software engineer from the software (the open source movement).

There is an interesting corollary here with Bergson's exercise of free will as creative action and the degree of choice in that lapse of ± 0.3 sec described as the sensorimotor interval of the new, the "now" or the multidimensional future-past. This synoptical collision of chance and choice is the bifurcating singularity, is contingency. Chance and choice are inseparable co-extensions of the contingent. They are tendencies or forces of the contingent much as perception and memory are tendencies of experience. Yet questions persist:

- On that neurological micro-scale - if there is no choice (free will or free won't) is there a chance for creativity?
- On a cultural macro-scale - if there is no controlling authority in aesthetic practice (director, composer, choreographer) is it art?

4. Improvisation and Contingent Composition

"My special interest in improvisation is that my aesthetic is 'chance'. It is what I love to see in a piece of work, it is what I find beautiful. The paradox here is that I do not want to communicate 'choice' as an aesthetic. I want to communicate 'chance' as an aesthetic. But, I cannot have 'chance' without 'choice'." Katie Duck

In the world of contemporary dance, improvisation as a diagrammatic interface be-

tween expression and content can be experienced in the work of Katie Duck and her Amsterdam-based group of dancers and musicians, Magpie Music Dance Company.¹¹² Duck has been researching chance and choice in improvised composition since 1973. Drawing inspiration from John Cage, Jimmy Hendrix, Derek Bailey and Steve Paxton, Duck has developed a distinctive improvisatory style that emphasises the 'exit'. It is a strategy of subtraction, not unlike a Bergsonian selection of useable images from a universal flux of images. The body filters this rush of images to make of sense of sense. Duck's strategy echoes Libet's veto or inhibition, as the force of free will (or free won't) of empowered choice in the split second now. But choice is a tool for Duck. It facilitates problematising, which prepares intuition. Choice is a tool for differentiating the observable presence of chance. This is the aesthetic of a Magpie performance. Duck says:

It is 'not' interesting, for me, that improvisation allows for the artists to make choices. I find that to be the problem of improvisation, not the solution! It is interesting for me that the artists can create a space for something to happen. That means not doing all of the choices. (Corbett, 1999)

Observing the trained body of an improviser, a body focused through affective patterning on the emergence of choice through chance, the filtering of contingent excess materialises in its most literal, living form. Duck's work also indirectly treats the complexity of the distinction between chance and indeterminacy. Her work is closer to Cage's ideas of indeterminacy than his experiments with chance operations. Paradoxically, her methods align with Boulez' insistence on controlled chance. She uses ontological rule-based structures applicable to the movers and the musicians:

I have only a few words that I will bring to the rehearsals.
Movement = memory
Space / Time = choice
Exit = Chance (Duck)

This requires parsing.

Movement = memory = virtual dimension

a) This is consistent with Bergson's thought. Memory moves in the virtual. In its impure form, composited in experience, memory is recursively folded back into the body as affect. Hypothetically, the exaggerated, proprioceptive transitions of a dancing body open an intuitive path for distinguishing the two tendencies.

b) "I would like the dancer/performer to only use what is of memory as an option

[...] By memory I mean, 'to remember' (Corbet, 1999). Here Duck evokes memory proper but habit memory is also marginalised as optional, as a defensive mechanism against the rush of excessive expressiveness. Patterned resemblance and similarity can serve as a veto function, a strategy of half-exit from too many choices. "You have to listen to the space in the theater as if it was the heartbeat of an old animal in order to understand your role because it is shifting all of the time" (Ibid).

Space/Time = choice = tendency of affect

a) This is consistent with the spatiotemporal continuum of experience (perception and memory) in which choice is the actualisation of chance. Chance instigates a contingent choice. This view oscillates with Varela's microidentity breakdowns (Chapter Four) and with the principle of *identity* as a becoming; a repetition of difference (Deleuze, 1994, 50).

b) Duck describes choice and chance as a constant process while "experiencing time in rapid and suspended slots" (Duck). Choice and chance become tendencies of affect. This intuition of contingency rhythmically passes through the body, through the virtual arrival and departure of affect:

A performer who improvises dance or music using only choice as their time structure will eventually lose any perspective of the space because choices come rapidly under the condition of performance and/or ensemble, more rapidly than there is space to contain. Eventually, the performer is no longer choosing. This is why chance is such an important innovation for the improvisation dance performance. (Ibid)

From another angle: "The highest operation of thought is not to choose, but to harbour and convey that felt force, repotentialized" (Massumi, 2002b, xxxi). Thinking is an *event* catalysed repeatedly by an aléatory stimulus. Choice repatterns the contingency of chance. "Repetition in the eternal return [...] concerns instead excessive systems which link the different with the different, the multiple with the multiple, the fortuitous with the fortuitous, in a complex of affirmations always coextensive with the questions posed and the decisions taken" (Deleuze, 1994, 141).

Exit = chance = tendency of affect

a) This is cryptic and contextually specific to Duck's terminology. "You do not need to remember to enter in an improvisation performance, but you do need to remember to exit" (Corbet, 1999). Exiting has an immediate effect on the relationality between the performers and the space. It evokes presence and its lack, absence. An exit globally changes the situatedness of the performers and audience. Exit is the

broad gesture of presence/ absence that obviates the nuance of microidentity shifts. "Rhythm, relay, arrival and departure. These are relations of motion and rest: affect" (Massumi, 2002a, 20). Chance in this instance, is a tendency of affect.



Figure 5.2: Photo of Katie Duck by Isabelle Vigier.

b) Chance, as exit, is departure and would appear to act as a limit-cycle in performance; as a stabilising form of negative feedback to counter the runaway positive feedback of unlimited choice. Chance, for Duck, generates a relation between chaos and order. The exit is the rest, the silence in polyrhythmic chaos. "Chance is what allows the ensemble to find order [...]" (Corbet, 1999)

c) Chance as departure haunts the by now familiar refrain of the repetitive differencing of identity; the fading primacy of the liberal human subject; the phase shift between singular and plural. Duck places 'choice' in the collective flux:

In the way I work, the dancers need to lose the 'self'. The expression of the 'self' is of no value, for me, when improvisation is the structure. It is odd how improvisation leaves the whole piece to choice and how we identify choice as the liberation of the 'self'. We can 'believe' that choice is what we are doing but actually choice is there without me or anyone else doing it. We can all choose to do nothing, for example, or we can all choose to exit. (Ibid)

To revisit the propositional format:

Chance : Virtual : : Choice : Actual

Memory : Virtual : : Perception : Actual

Chance/Choice : Contingency : : Memory/Perception : Experience

Contingency : Time (virtual) : : Experience : Space (actual)

Chance/Choice = Intuitive Contingency

Situating affect in improvisational performance, focus again shifts to the body. The body becomes the affective continuity of contingency; a zone of indeterminacy; ontogenetic and autopoietic. Bodies, in ensemble improvisation are transductive relays from which, under certain conditions, an ethical, political aesthetic of belonging-together emerges. Perhaps the most prescient remark in David Cope's 1976 book *New Directions in Music* foresees this aesthetic in a synergetic ecology:

[...] Indeterminacy, as a step-by-step (even pedagogical) approach to *erase or distribute that control over compositional elements* which so many have fought to retain, must first transcend man's loss of individual and "racial" ego. As such, it is merely *the first step to a far-reaching eventuality*: rejection of all homocentered creativity, and acceptance of all of the life around us, with man no longer in control, no longer the creator or destroyer of images or ideals, real or imagined. (170-1 emphasis added)

Here Cope taps the pulse of improvisation's dialectical duels as a transformative cultural feature. Recall the posthuman paradigm – this is it; co-operative ecologies of human and nonhuman (animal and machine) transversality. Recall the joystick generation and their acceptance of an 'out-of-control', far from equilibrium playing field. Recall multi-maker, interauthored composition and the abdication of ownership. Recall collective individuation. Erasure. Distribution. Resonance. Rhythm. Emergence emerges.

Cultural Jamming with Networks: the emergence of merge

Jamming is now a synonymous term for group improvisation. It's old slang¹¹³ transiting to a new vernacular; an emerging method of play in music, dance, vj/dj'ing, acting and translocal webjams. Although the history and methods of jazz improvisation are a rich archive for conjuring examples of group practice, it is now prudent to "cut to the chase"; to examine online collaborative jamming that exemplifies transductive transversality. Webjams offer all the paradoxical complexity that twentieth century discourse on improvisation and composition has instigated. They tend towards sympathetic, co-operative practice. The emergence of merge. Webjams may also support competitive, "one-ups-man-ship" through technical virtuosity similar to other face-2-face genres of improvisation. There is a discernable common sensibility, at this early stage of development that tends to favour protocols of trust,

patience and sharing (copyleft, Creative Commons¹¹⁴). This may well be a naïve first-phase ideology but it warrants acknowledgement. The following examples of network jam aesthetics, on and offline, complement KeyWorx compositional practice, hinting at a broader, historical scope of the genre. These examples are by turns, critical, optimistic and reflective.

1. The HUB: The Hub was a San Francisco based group of musicians and sound artists, Chris Brown, Scot Gresham-Lancaster, Mark Trayle, Tim Perkis, Phil Stone, and John Bischoff, who performed as an ensemble for more than ten years.¹¹⁵ They developed distinctive methodologies for real time, digital collaboration and are arguably, the first such group to focus on live, computer-networked improvisation. “The Hub” is actually a small computer that allows players to send and receive messages between them. Chris Brown and John Bischoff (USA) write in their historical compilation of texts:

There was a distinctly improvisational character to many of these [performances] as the music was always different in its detail. Mathematical theories of melody, experimental tuning systems, artificial intelligence algorithms, improvisational instrument design, and interactive performance were a few of the areas explored in these solo works. More often than not, the composer designed real time controls so that a human player could adjust the musical behavior of the algorithm in performance. *These "openings" in the algorithm became important features when adapting the solo within the network band context—they were natural points where incoming data from other players could be applied.* The solos, played simultaneously in the group setting, became interacting “subcompositions, each sending and receiving data pertinent to its musical functioning. (1970-2002, emphasis added)

For the Hub, music improvisation was networked and, intrinsic to the genre, computational – a mix of human and machine intervention. Algorithms could be “opened” and modified by players and by other generative algorithms. They successfully integrated individual compositions, the constraints of social convention



Figure 5.3: *The Hub, performing live at Mills College on Oct. 6, 1989. From left to right, Perkis, Stone, Brown, Gresham-Lancaster, Trayle, and Bischoff. In the centre, on the lower platform, are the twin SYM-Hubs.*¹¹⁶

and the recursivity of the algorithmic. Bischoff and Brown have written of their motivations in the article "Hub Aesthetics." The lengthy quote below describes a precedent, set in 1987, for a style of collaborative composition that continues to evolve in contemporary networked performance. For The Hub, distance was a variable component, not the *raison d'être* of the composition:

The NYC debut of the Hub was a success, and provided a notoriety for the group that launched a 10 year career. But the beginning of the band was a commission for a musical stunt, which became both a blessing and a curse. The idea of having musicians play with each other from distant locations was then, and has been ever since, of considerable interest to promoters, publicists, and audience. Kyle Gann's review title "musica telephonica" emphasized the idea of the *physical disconnect*, the capability of creating music without being physically present, "phoning it in". But the band itself was always far more interested in the aspects of *performer interactivity*, *algorithmic complexity*, and the *web of mutual influence that the network provided*. The network was a way for computer musicians to create a new kind of musical ensemble that allowed them to interact in ways that were unique to their medium. We were interested in the sound of idiosyncratic, personal computer music instruments that could influence, and be influenced by each other. The Hub became a way to *extend compositional ideas from the solo electronic performer to an ensemble*, creating a new form of chamber music [...]. It was also a mission to point the development of computer music away from the paradigm of dominance to one of *creative anarchy*. (Brown, Bischoff, emphasis added)¹¹⁷

Performance at a distance was not the motivation of this remarkable ensemble. The creative networked interaction they plumbed was spatially “nonlocal”. Proximity mattered in a conventional sense. The ability to gesture and glance, breathe the same air, sense the same ambience, enhanced the belonging-together. The radical innovation of The Hub was distributing content and processual expression through a wired network, shattering the proprietary boundaries of compositional ownership. This was translocal performance practice.

That XI/Clocktower performance took place in 1987. For the next ten years The Hub resisted efforts from producers to use newer Internet protocols and jam at a distance from one another. They preferred performing in the same physical space where they could see and hear each other directly. In 1997 they capitulated and finally accepted an offer to perform translocally, the piece was called *Points of Presence*:

Our six-member group is divided, two-each between three locations - at ISA/ASU in Tempe, California Institute of the Arts in Valencia, and the Center for Contemporary Music (CCM) at Mills College in Oakland. Each member of the group plays a computer at each of these sites by sending control data over the internet that starts, changes, and stops sounds on their own software instruments. We call the machines we control at distant sites "remote-renderers", and the ones we sit next to are "local-renderers." (Brown, Bischoff)¹¹⁸

By their account, this project was a total failure. They disbanded. They did not disband because of complications with the latency of the arriving data, often a hurdle in networked synchronisation (which interestingly was between 100 and 300 ms). They disbanded because with all the ensuing and unfolding technical problems between operating systems, CPU speeds, etc, they were unable to problem-solve and immediately cope in the way they were accustomed - in the same space, together. “The technology had defeated the music. And after the concert, one by one, the Hub members turned in their resignations from the band.” (Ibid)

In a kind of karmic twist, the Hub disbanded in frustration at the same time the KeyWorx project received its initial funding, optimistic of building a technology that would enable synchronous, collaborative composition at a distance. Technical problem-solving concurrent with artistic performing, is a “feature” of translocal practice that has plagued and frustrates most performers. In many ways, instability, both technical and performative is co-extensive with the genre. One might

make the assumption that bug-free, crash resistant performances are of a higher creative quality but that assumption would be impossible to substantiate as seasoned improvisers work with what is at hand, embrace a kind of crash resilience. The laptop generation of performers opting for this nerve-wracking medium, like the joystick generation described by Steven Johnson that “[...] that have developed another skill that almost looks like patience: they are more tolerant of being out of control, more tolerant of that exploratory phase where the rules don’t all make sense, and where few goals have been clearly defined” (2001, 177). KeyWorx, Max/MSP/Jitter, pd, SuperCollider, etc. performers have developed that patience to the point where failure is a begrudgingly accepted feature of the genre. A shoulder shrug and a reboot. A bleeding-edge perseverance that “knows there’s no success like failure, and that failure’s no success at all” (Dylan, “Love Minus Zero/No Limit,” 1965).

Music jamming in all its genres is a known and vital activity in the art of producing new forms and combinations of sound. It keeps formal structures from ossifying, injecting the unpredictable through the constraints of tradition. Dance improvisation works in a similar vein. It heightens sensitivity to the situatedness of movement; to stasis and motion in the surrounding environment; to the transductive modulations between the affected and the affecting. Jamming with computers as instruments or prosthesis could be similarly construed, opening additional dimensions of sensation in the virtual, shared space of the network. But the computer, in its relation to creative processes, is more than instrumental. The complexity of its technicity, integrated in the collective individuating of the making process, give it generative qualities beyond that of the saxophone or the paintbrush. It is itself an individuating player in the consistency (to use Deleuze’s term) of the performance.

2. [SHARE]: In 2001, a group of techno-artists in New York City, committed to sustaining a collaborative, collective improvisation and jamming culture, inaugurated [Share], a fluid assemblage of artists from all disciplines who meet on Sunday’s at Openair, an East Village bar, to participate in spontaneously constructed performances. Their credo states:

[Share] begins every Sunday at 5pm with the open jam. An open-mixer system for video and audio lets participants patch their equipment into the multi-channel, multi-room sound system and multi-screen video system. Artists are encouraged to bring any portable audio and video gear and take a turn sharing, join in an open jam, or form impromptu collaborations.¹¹⁹

These are artists of the generation that are comfortable with the unstable, with out-of-control. They are also at ease with, as their name implies, sharing. You will rarely find among this group an argument over copyright or ownership of material, much less concepts. They jam. The content *is* the expression. With enabling technologies such as KeyWorx, all media files are distributed to every player in the session via a peer-2-peer file transfer protocol – “your media is my media and all media is malleable.” Any “preciousness” of individual content and expression is blurred, sometimes beyond recognition (that proximal point where perception and memory meet).¹²⁰ Helen Varley Jamieson has said of these weekly webcast events in a Rhizome press release “Pass the Jam, Please”: “Like jazz, this is probably most fun for those who are actually doing it” (2002).¹²¹ This statement provocatively questions the nature of *performance* itself.¹²² Jamieson taps a sensitive point. Performances involving a brigade of laptop performers, gazes directed at the flickering pixels on their screens, is often criticised as inaccessible. This begs the question: For whom is performance for? Are those autonomously distributed percepts and affects shared outside the enactions of the players whose sensorimotor capacities are intuitively *and* causally implicated? Are the spectators participants?

Local audiences often exit translocal events with little clue as to what they were experiencing; with few descriptive resources to explain that experience. The concepts and their execution can appear to be an impenetrably closed loop between the performers; an experience to which an observer is denied access. Yet for many new media artists, the role of a participant spectator is not only acknowledged but crucially imbricated in the interactive realisation of the work. Another paradox. Here, the focus is on the sensations produced and distributed in processual composition. What is involved in the process of production? How are concepts formed, decisions made, aesthetics shared, during a multimedia, translocal jam? This *is* a relational process between the performing artists in the first place. Through the intuitive relay of rhythms and the accents of polyrhythms, they transduce analogue and digital energy fields to arrive and depart a shared zone of indetermination. If the audience has no entrance to transforming that dynamic through the technology (though they often do) then, as has been the case across time and cultures for spectators, they participate in the event by their situatedness within it. Performance is a hyperecology. A souped up, overfull readiness potential of an event dimension. Even in a ‘failure to communicate’, as with the last Hub performance and a million others like it that take place every day, everywhere, in what Goffman has called the “presentation of the self in everyday life” (1959), there is palpable potential.

3. *decentred* / *distributed*: In March 2004, *decentred/distributed* improvisation be-

gan hosting live, networked webjams from their base in Norwich, UK. Presently there are over thirty participating artists in their community. Their website contains an archive of performance material. Below are excerpts from an interview between the coordinators Liam Wells and Tom Simmons with interviewer Simon Waters. Their views on distributed improvisation and networked performance are so sympathetic with KeyWorx artists that it's important to quote this interview at length. The philosophy underscoring the decentred aesthetic touches on all of the elements foregrounded in this thesis that shape compositional technicity: relationality, contingency, in-betweenness of media, decentred abdication up of control, interdisciplinary participation, intuitive process, shared aesthetics. Coupled with KeyWorx practice, a LiveArts aesthetic takes shape:

SW It wasn't the technical side of things that I was getting at really, it was the idea of a network implying some sort of shared aesthetic and the idea of an individual residency being about an imposed curatorial vision. I understand the rationale behind it, because it may partly be a response to the original WebJams and a response to the dissatisfactions that you felt with previous working practices.

LW There are problems with negotiated aesthetic output because it's not something that people have a lot of practice at. *One rapid way of dealing with that might be to allow somebody to impose a temporally formal shaping to what goes on.*

TS We see the project existing in two states, firstly in a kind of automated state with a *system existing in the background*, which we set the parameters for in advance. Between us *we collectively define the limits of the system, purposely making them frayed*. We envisage moments when that system will be pulled in particular directions towards a discipline or practice before moving back into an automated state.

SW You mentioned working in a post-medium condition, and you've used the term 'in-betweens' or 'in-betweening' for some of what you're doing, is that something that you both have a shared take on?

LW I think *the 'in-betweenness' is the point that we met in*. Both of our individual practices evolved *around notions of being between two states or being between media*.

SW The people who are involved are from increasingly hybrid backgrounds. In a sense you're symptomatic of a particular generation of people. You have this aim to work in a post medium condition or an 'in-between' situation, but you're determined to very strong extents by your formal backgrounds and training. *Increasingly, there's a generation of people who are*

more genuinely hybrid than you, how do you go about evaluating what it is that they do?

LW Hmm, quality control,

SW Well, its not really control. I'm interested in the evaluative mechanisms you have, it might be that they're instinctive ones. I think that's perfectly legitimate.

LW I think you've hit it on the head really, *it's intuitive in the way everything is selected at some point*. Whether we're selecting the performers or putting together an apparatus. Ultimately everything is selected when it goes out to the public interface. We have other levels of control, negotiating different access points to the same project. It's a situation where something that's happening at one end of the performance in one venue is very different to what's actually happening in the other venues or in what the audience is experiencing.

SW Yes, but that's part of the point ...

TS *Part of this process is concerned with giving up control ... the idea of de-centering something is about moving it outside of your jurisdiction, about seeing what happens when you have to negotiate events which emerge in that context [...]*

SW Can you elaborate a little about what you mean by decentred improvisation? I mean you're obviously talking about decentred improvisation in the senses of distributed activity, but is there something else behind it?

TS *There's something ideological or political underneath, moving ...*

SW Away from medium centers?

TS Yes. SW And established bodies of knowledge ...

TS *Trying to move into this cooperative space where the meeting points, the collisions and the attachments of one thing to another, are not restricted by fixed ideas of what an improvisation might be.*

LW I think it's key that this is angled towards a very public space. I think that starts to create a distance from the closed doors of the institution or the specific media.

TS Part of the organic growth of the project can be attributed to this cooperative mechanism; on any level of organisation *I think decentred is cooperative and negotiable.*

LW Part of the potential of redesigning the interface as we have done is to feed back responses between ourselves during the project.

TS We're keen to experiment with a non-governed network. We've been discussing rejecting a permanent site of storage. Temporally buffering data to be continuously directed towards, rejected from and re-directed to any

number of servers, so data is never consciously organized by us at any point in a performance.¹²³ (*italic and boldface emphasis added*)

Composition as Transductive Affect

The autonomy of the interrelation of relation generates the affective intensity of a shared or distributed creative process, palpable in the performed event. Irrespective of the vagaries of describing improvisation methodologically, it is the practice of composition on a tightrope. And in that precarious balancing act, sensations ride the interval; qualitatively leap, on occasion, to new dimensions of reality. Technically, there is no perception without affection. No percept without affect. *Affect* exerts a kind of action on the body itself as a relation between perception and movement (Deleuze), the power of the body to catalyse action on itself (Bergson) or synaesthetic shapeshifting (Massumi).

Deleuze unhinged this power from the body and placed it in an autonomous framing function outside the body – in selecting images from the universal flux, in the disembodied affection-image, in the nonhuman becoming of sensation. But he also flipped the transcendental back around to the immanent in a surprisingly essentialist gesture. Hansen attempts to return affectivity, after a Deleuzian stroll through the implicate order of the chaosmos, from the frame back to the body. The gap (interstice), filled by the hyphen between the sensori and the motor is, for Hansen, the “proprioceptive interval” of affect *within* the body. Hansen reappropriates Deleuze’s cinematic “Any-Space-Whatever” and alters it to fit a digital context¹²⁴ – a *digital* Any-Space-Whatever (ASW). The interstice between image frames and modalities (sound/image) becomes a mutable pixel affecting the body in “unprecedented” ways (Hansen, 2004, 205); the autopoietic kernel of the space of the body that creates images of reality, “extracts a lived space from the universal flux of information and in so doing restores the possibility for belief in the world” (Ibid, 216). Here Hansen references Deleuze’s work in *Cinema 2* (1986b, 175) in which irrational thought, the power of the outside that passes through the interstice instantiates the potential for “restoring our belief in the world.” Hansen translates the celluloid interstice directly to a corporeal spacing via digital imaging that remains unconvincing, precisely by its reliance on image abstraction alone. Massumi’s multimodal hinge dimension, a synaesthetic biogram, offers an affective translation of the interstitial through the feedback of higher cultural forms but need not exclusively prioritise a digital subsumption. This concept resonates here as translocal intuition, a “belief in the world” that emerges from co-operative diagrammatic processes and open-ends ethical potential.

Translocal composing has evolved from interdisciplinary improvisational practice. The increasing availability of real time data transfer through broadband accessibility opens another performative dimension to the issues foregrounded here. This thesis borrows Deleuze's description of *composition* as a reference for aesthetic processual production. The following chapter will examine KeyWorx composing and the production of aléatoric and indeterminate lines of flight that structure the interaction. These vectors intersect the concept, the function and the percept/affect and their respective planes of immanence, reference and composition. This plausible scenario becomes an argument, foregrounding the problematic of *interference* between these discrete domains. Evaluating translocal practice as diagrammatic practice catalyses a fresh line of questioning: Is the experience of translocal composing intensified because it is socially convened and culturally exposed? Is affective intensity "localised" in the body?

Chapter Six

How to Diagram a Biogram

It has been suggested that extending the concept of the diagram into the biogram might be a vector worth pursuing. Formal topologies are not enough. The biogram is a lived topological event. It is onto-topological. It is the event of experience folding back on itself for its own furtherance, its continuing becoming. Onto-topological means ontogenetic. The biogram is experience reaccessing its powers of emergence, for more effect. It is the existential equivalent of lifting oneself up by the bootstraps: ontogenetic and autopoietic. (Massumi, 2002a, 206 emphasis added)

Massumi's challenge of extending the concept of the *diagram* to its *living* complement – the *biogram* – is the vector pursued here. It parallels the thread of networked information systems viewed as biotechnical *living systems* (Chapter One). The ontogenetic and autopoietic bootstrap reference in Massumi's description reflects a Varelian example of autopoiesis: "A self-distinguishing entity exists when the bootstrap is completed. This entity has produced its own boundary [...] It is, by itself, a self-distinction. It bootstraps itself out of a soup of chemistry and physics" (Varela, 1995). This individuating of the cell on a micro level, and of the organism, on a meso level, can be further extended to a creative collective on a macro scale. The biogram as a recursive, self-generating repotentialisation.

A biogrammatic path will be contoured through a translocal event-dimension, the *Interfacing Realities* performance at DEAF03 at V2_ in Rotterdam. Though this performance has been selected as an example it is in no way a "one-off". It is representative of a genre. A genre evocative of the main threads traversed in this thesis so far – emergence expressed through transductive, intuitive processes in collective composition (human and machine) enabled by digital technologies. This genre of performance practice fulfills Protevi's criteria for heterostratic, diachronic transversal emergence (Chapter Two); feeds the experience of emergence back into the composing to describe biogrammatic practice. Within this focused single performance scenario, the enabling technologies are the Internet, its protocols and KeyWorx. Thus far in this thesis, ontogenetic and autopoietic precedents, from diverse perspectives in philosophy and science, have been established. The ontogenetic and autopoietic character of play and indeterminacy in improvised composition in the performing arts has been explored. What remains to be accounted for is an analysis of the convergence of these threads in real time, mediated, group composition.

The task then, is to position the transduction of compositional modalities (image, sound, text) in KeyWorx sessions as diagrammatic and the diagrammatic as cata-

lytic. Massumi's proposition can then be traversed as the *experience* of collective composition, biagrammatically incorporated and transversally shared through interplay; through synaesthetic distribution achieved in multi-modal media processing. These audio-visual-haptic manipulations are collectively generated and negotiated, provoking the intensity of sensation through distributed networking. A biogram is itself the translocal "place" which "arises from a dynamic of interference and accord between sense dimensions" (Massumi, 2002a, 182). In KeyWorx performativity it is a doubled sensation of orientational and sensory cross-referencing.¹²⁵ *This translocal biogram is the synaesthetic "spacing" of affectivity that situates a networked performance; situates the intuitive centre of indetermination in an intersensory hinge dimension that feeds experience back into itself.*

Intuition as a thought process is integral to improvised performance. Real time collaborative composition interfaced through IT technologies is transversal: a biological, social, technological intersect. What will be amended to the intuitive and transversal is the synaesthetic – a transvergence of modalities; dynamic linkages between sound and image parameters, between text and sound parameters, between diverse image elements such as shape effecting color, amplitude effecting size, between vision and proprioception, etc. Though the KeyWorx technology and KeyWorx enabled performances are analysed here, elements of the process are emblematic of a much broader genre that could include events in online gaming, MMORPG's and a variety of net art initiatives using diverse infrastructural technologies.

Concept 4: *The composing in a co-operative KeyWorx translocal event is diagrammatic and synaesthetically biagrammatic.*

The Diagram, Code and the Abstract Machine

What is a diagram? Brian Massumi calls it "the dynamic interrelation of relations" (1992, 16), a definition that could equally serve as a description of performance practice. It particularly suits collective improvisatory or indeterminate performance methods in dance, music, theater and online multi-player gaming. This relational diagrammatic process can be tweaked as the method and the rhythmic pulse of multi-maker, real time, translocal performance. The word "diagram," in the original Greek, comes from the root verb "diagramma" which does "not simply mean something that is marked out by lines, a figure, a form or a plan, but also carries a second connotation of marking or crossing out," suggesting not only ephemerality but also an incompleteness that carries an expectation of potential.¹²⁶ That connotation, of the redrawn "flickering signifier" (Hayles, 1999), is of course radiant with

analogies to the digital image. It is even more appropriate to multimodal representation in the digital domain of the ephemeral canvas in which *process* is the relational interstitial dynamic between content and expression. The diagram refers to the wax tablet Greek philosophers used to compose ideas before committing them to papyrus with a stylus (Knoespel, 2001); the blackboard and chalk of the mathematician and scientist; the notebook of the artist; the sketch of the architect; the inked napkin from the business lunch. *The diagrammatic is the movement of thought and sensation: erasable, renewable, gestural, disposable*. Reciprocally (autopoietically), it is the individuating subject of the mathematician, the artist, the architect, the executive producing abstract relations diagrammatically situated between a form of expression and a form of content. The diagram becomes a type of topological transformation, variably looping between virtual potential and the actualised possibility. For Deleuze, the term is nearly synonymous with what he and Guattari dubbed the *abstract machine*, an unstable, spatiotemporal multiplicity, unravelling significations. Massumi describes the abstract quality of content's expression and expression's content:

The 'machine' is abstract because the asignifying signs with which it concerns itself lack determinate form or actual content definition. Though abstract they are not unreal. *They are in transport*. They constitute the dynamic 'matter' of expression. When they settle into *rearticulations*, they become 'substances': formed functional elements of either content [...] or expression... (2002b, xx emphasis added)

The *abstract machine* is a dimension of the situatedness of relations and the forces that subtend them. It is a meaning machine, assembling infinite 'meaningful' pluralities of fractal diagrams into a "formal diagram of forces" (Massumi, 1992, 17). It produces layered polyrhythms. The refrain that comes back around, and around, with a new force, regenerated from its own future-past-becoming to pull itself "up by the bootstraps" as biogrammatic eventness. Ontogenetic and autopoietic.

The abstract machines of translocal performance can themselves be diagrammed like the intersection of two fault lines in *Figures 6.1 and 6.2*: the bidirectional forces of local-global and content-expression rupturing, colliding, skewing and producing dynamic, in-between multiplicities. These disjunctions are themselves

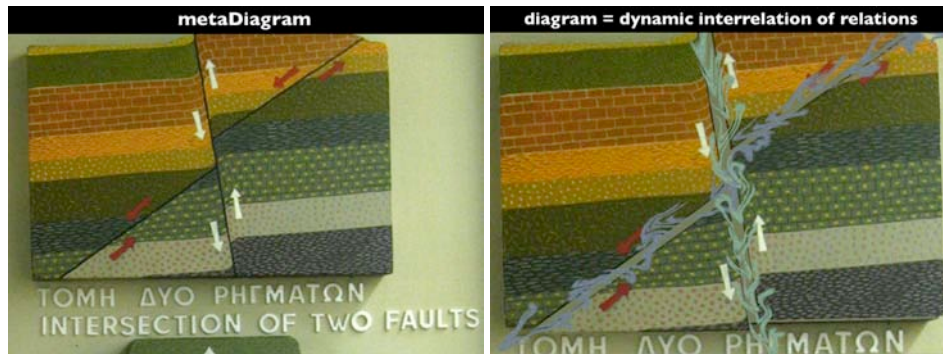


Figure 6.1a and 6.1b: A photo taken of an installation on fault lines in the Natural History Museum of the municipality of Kifissia in Athens. It is a complex metadiagram of intersecting fault lines and the collision of bi-directional forces of stress, creating disjunctions in the earth's strata. The image on the right illustrates the fluid, informal dynamic of the diagrammatic interstice.

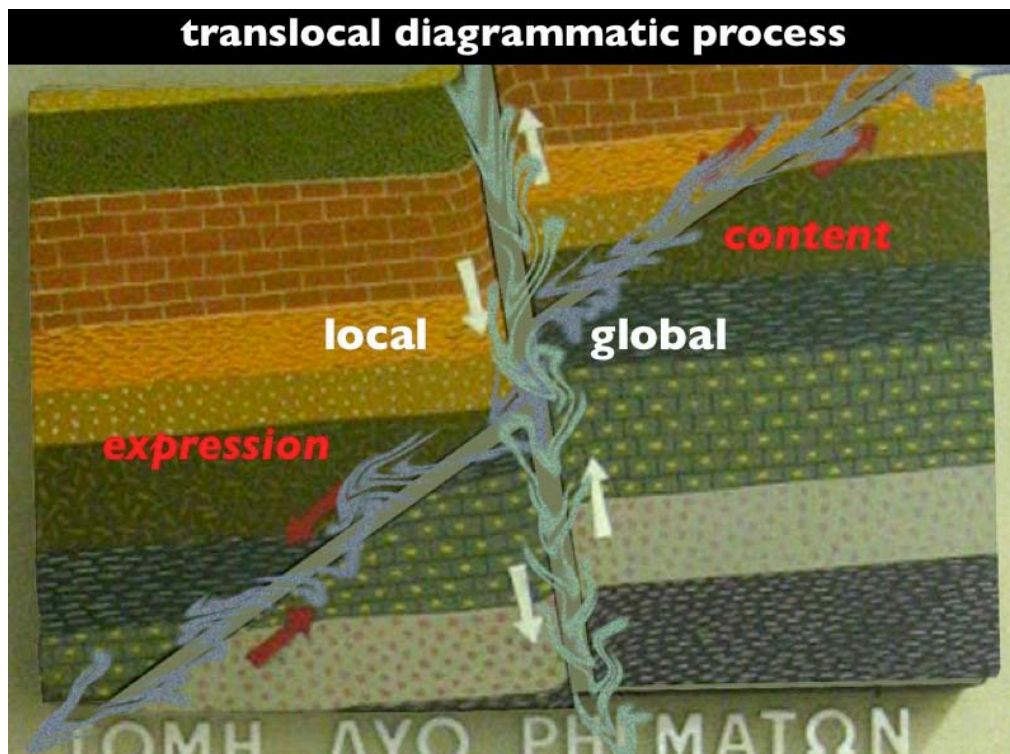


Figure 6.2: Here the diagram is further abstracted as an example of a diagram of a diagram of forces or tendencies in translocal performance. Abstracting the bi-directional forces of stress that create the rupture in the earth's strata as intersecting forces of local-global and content-expression. **The translocal event** is depicted here as a catastrophic, discontinuous change between the performative movement in the content-expression interval as it intersects with the push-pull threshold of territorialisation-deterritorialisation.

diagrams, phase-shifting in continuous individuating variation. Oppositional stresses create a folded middle, the smooth space of their passing through each other, the *translocal* “place” of local-global, the *dynamic matter* of content-expression. With translocal performativity, unstable packets blitz through Internet protocols, transduced as pixels, as commands, as projected light, as waveforms jolting woofers and tweeters. Collaborative distributed diagramming exemplifies the translocal threshold of cross-referenced co-creation. Translocal performances actualise the complexity of the polyrhythmic process.

Forces of content and expression

Deleuze and Deleuze&Guattari explored the diagram from several perspectives. The diagram as a territorial-deterritorialisation as opposed to signifier-signified relation is implicit in the translocal (1987, 531).¹²⁷ Another vector extrapolated on Foucault’s diagrammatic *panopticism*.¹²⁸ Here Deleuze explored the diagram as a map of power relations, a cartography of strategies. The diagrammatic map establishes a multiplicity of relational points in the gap between a discursive form of expression and a non-discursive form of content, the articulable and the visible. This can be broadly interpreted as the “cracking” of the fault line between content and expression depicted in *Figures 6.1a and b and 6.2*.¹²⁹

The strategic diagram maps an enigmatic dimension of the relational play between forces in translocal performance: social, aesthetic, technological manoeuvres in the composed chaos of a distributed event. The power or force to affect and likewise be affected is disseminated through non-stratified functions, through the interstitial cracking of smooth virtual continuity *and* its potential catastrophic discontinuity, leaping to another field of play. The nonlocal relations of the quantum and the Internet propose diagrammatic processes:

The diagram or abstract machine is the map of relations between forces, a map of destiny, or intensity, which proceeds by primary *non-localizable relations* and at every moment passes through every point [...] *the diagram acts as a non-unifying immanent cause that is co-extensive with the whole social field*: the abstract machine is like the cause¹³⁰ of the concrete assemblages that execute its relations; and these relations between forces take place 'not above' but within the very tissue of the assemblages they produce. (Deleuze, 2000, 36 emphasis added)

The diagram then, itself a fluid, processual field of potential, is a particular contrac-

tion of the interplay of forces. This view of the diagram is another dimension of its relationship with KeyWorx composition; the production of co-operative manoeuvres in the chaosmos¹³¹ of the recursive deterritorialisation of the network. The ever-present, confined yet distributed space-time, envisioned by Foucault as the “panoptical” in *Discipline & Punish*, is the transduced content, flickering from the constrained flatland of the computer screen (when *distributed* as a shared environment). This is the scenario, in both its utopian and dystopian attitudes, of a KeyWorx session. The relations of forces construed in Foucault’s reading are certainly impacted in the co-extensive local/global powerplay between artists and machines and represents an important, crucial aspect of the experience of translocal jamming. For if the diagram is an interstitial multiplicity of relations between forces (inside and outside), then it’s the compositional *forces* themselves that emerge and transform. The stratified composition is the by-product of diagrammatic transformation. And those forces of the visible and the articulable (image and texting in the *Interfacing Realities* performance) are multiplicities of two irreducible types in the non-place of the translocal:

[...] statements exist only in a discursive multiplicity, and visibilities in a non-discursive multiplicity. And these two multiplicities open up on to a third: a multiplicity of relations between forces [...] This means that the diagram, insofar as it exposes a set of relations between forces, is not a place but rather a ‘non-place’: it is the place only of mutation. (Deleuze, 2000, 83-5)

The ephemeral diagram that dissipates in the oscillating interval is renewed in the forces that it delineates. This is an asignifying process; a force of becoming, a tendency of becoming-other. It emerges from the interstice, from the distributed affect that modulates multi-maker composition. The diagrammatic jam is the relation of these forces, the in-itself of interplay that transforms. In translocal interplay, the becoming-composition, transducing its stratified media layers, transforms through the functional, affective and conceptual forces of the players. The non-discursive and articulable layers appear to interweave and dissolve, to re-emerge as mutating strata within the plane of composition.

KeyWorx as Abstract Machine

The aesthetic and synaesthetic experience of diagramming is of primary interest here. A KeyWorx jam: “is an abstract machine. It is defined by its informal functions and matter and in terms of form makes no distinction between content and expression, as a discursive formation and a non-discursive formation. It is a ma-

chine that is almost blind and mute, even though it makes others see and speak” (Ibid, 34). The diagrammatic ‘output’ of the abstract machine is the ‘meaningful’ in-between of content and expression. The multiplicity of *meaning* as an asignifying process occurs in the event of this interstice; this encounter between forces. What emerges is so exponentially fractal that Massumi calls *meaning* the being of the “nonrelation” between content and expression or a “separation-connection” (1992,16). When the formless, asignifying matter of expression processed by the abstract machine is “rearticulated”, it becomes a functional, substantive element.

During a KeyWorx jam, in the diagrammatic gesture, as is clear from the artists’ documentation of the *Interfacing Realities* event, the form of content and the form of expression are indistinguishable. Massumi makes a point regarding the process of content-becoming-object through expression that simplifies the tensions of the chance/indeterminacy debate of the last chapter:

[...] the actual content of expression – what effectively comes to be signified [...] – emerges from expressive potential through a process of the capture of that potential and that this emergence into being-determinate necessarily crosses a *zone of indeterminacy* by virtue of which the whole affair is tinged with an element of *chance*.” (Massumi 2002b, xx-xxi emphasis added)

The zone of indetermination through which potential passes on its way to capture is “tinged” with chance. Most improvisers would agree with this, though a stronger “suffused with chance” is perhaps more accurate. As abstract machine, the KeyWorx software infrastructure doubles the diagram as a codified cartography of immanent abstracted functions, algorithmic procedures, machinations and effects.

An abstract machine in itself is not physical or corporeal, any more than it is semiotic; it is diagrammatic [...] The abstract machine is pure Matter-Function—a diagram independent of the forms and substances, expressions and contents it will distribute. (Deleuze and Guattari, 1987, 141)

As abstract machine, KeyWorx is the autonomous in-between relation. The lower (machine) and higher (interface) level code is an open framework independent of the content and expressions it distributes. It enables relational contingencies, playing a piloting role, “constructs a real that is yet to come, a new type of reality...” (Deleuze and Guattari, 1987,142) – indeterminate, nonrepresentational expression becoming determinate content. This abstract machine, assembled by the players, recursively generates further diagrams through human-computer-human-

interaction (HCHI), through the emergent potential of the event enabled by the contingent playfulness (spontaneity/intuition) of collaborative making. A diagram enacting diagrams through biagrammatic individuations: “No matter how formulated or codified a diagrammatic continuum may appear, it can be written over, marking a moment of change” (Knoespel, 2001, 160).

The Diagram and Rhythm

What holds the synergy of a KeyWorx performance together is not only the world-glue of affect, it is also *rhythm*. Not the steady beat of a single pattern but the intuitive ride through the complex pulsings of polyrhythmic layering, interwoven in a felt unity of propulsion. This is the interstice as a temporal multiplicity of a complex of durations, a diagrammatic separation-connection of fractal meaningfulness; a phase-shifting individuation. Rhythm in KeyWorx is the movement between the “strata” or the layers¹³² that comprise what Deleuze and Guattari would call a plane of consistency¹³³ that in this case is the actualisation of a complex assemblage of elements. This emergent, relational, diagrammatic in-between is a *polyrhythmic resonance*. It can arise between things or when one (thing) is in excess of itself. For Deleuze, rhythm articulates a power beyond the lived, phenomenal body. It constitutes a logic of sensation. This rhythm, reverberating as does an echo between canyon walls, is vitally evident as distributed sensation in the improvised composition of a translocal, separation-connection; in polyrhythmic interplay, in the space between the beats.

For Deleuze and Guattari, rhythm and chaos have something in common – the in-between. “In this in-between chaos becomes rhythm, not inexorably, but it has a chance to” (1987,313). Rhythm is also functions as the curb to chaos. It is a control function. Speculatively, it’s curious to consider to what extent a Deleuze and Guattari of the digital generation would choose to contain chaos with rhythm. Rather, one could orient towards the polyrhythms *immanent to* chaos and the embrace of an out-of-control, indeterminate aesthetic. Out-of-control is meant in this case as an ontogenetic *and* autopoietic diagramming in which the power relations between all players, human and machine, are self-organised and non-hierarchical in terms of aesthetic resonance. Moving from rhythm to polyrhythm generates conditions of possibility for far from equilibrium modulations. These relations reaccess their own emergence; perpetuate a positive feedback. These are favourable conditions for the *becoming* of the *biogram*, lived experience polyrhythmically, compulsively, reigniting itself. Polyrhythms privilege the qualitatively temporal. In polyrhythmic diagrammatics of the translocal variety, *control is transversally emergent; ethical*. It

evolves from the indeterminate interplay of humans and machines and the liminitive logic of their respective social and software protocols. Higher cultural forms feedback, mingle and re-emerge through sensation and silicon.

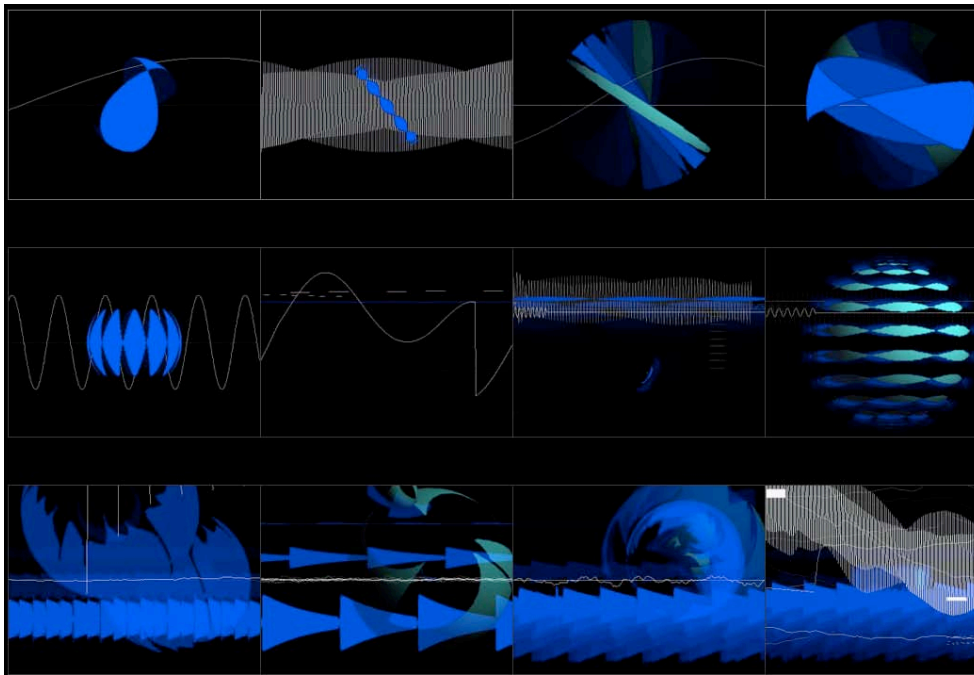


Figure 6.3: A literal example of rhythmic qualities accessed in a KeyWorx session between two artists who limit themselves when performing together to the visualisation of sound. Screen Captions between Daniel Vatsky in New York and Isabelle Jenniches in California, 2003 “We have such a minimal approach that whatever one of us brings in is huge. It’s just a waveform, but the way the waveform is, can instantaneously take my breath away. That’s really true. With him, and this very minimal approach, it’s really nice in that sense. Very rewarding.” – Jenniches

Chapter Five pointed to controversial, aesthetic attitudes towards chance operations and indeterminacy in music in the mid-twentieth century. The divisions were largely cultural. American composer Morton Feldman, a colleague of Cage, voices a Bergsonian perspective on duration and indeterminacy by foregrounding rhythm:

I once had a conversation with Karlheinz Stockhausen, where he [...] began beating on the table and said: “A sound exists either here-or-here-or here.” He was convinced that he was demonstrating reality to me. That the beat and the possible placement of sounds in relation to it, was the only thing the composer could realistically hold on to. The fact that he reduced it to

such a square foot made him think Time was something he could handle and even parcel out, pretty much as he pleased. Frankly, this approach to Time bores me. I am not a clockmaker. I am interested in getting Time in its unstructured existence. That is, I am interested in how this wild beast lives in the jungle - not in the zoo. (Feldman, 1969, In: Cope, 1976, 152-3)

Rhythm is not a dogmatic, quantitative meter, it is “always undergoing transcoding” (Deleuze and Guattari, 1987, 313). In *la durée* composition, the rhythmic interval is the in-itself of transduction, of *movement* through an intervallic body (affective, proprioceptive, synaesthetic). Collective composition produces emergent, material artefacts from a temporally privileged performativity. Some KeyWorx performances have evoked it; entered biogrammatic zones of indetermination through the intuitive intersection of multiple durations. See Figure 6.3. Duration - what differs from itself - is polyrhythmic. Intuition intersects the dynamic, idiosyncratic timings of the players, the hardware and software, and the unseen player-multitudes that traffic the Internet and affect its speed. This confluence of durations and speeds (machine time, metabolic time, cognitive time), affectively negotiated and folded by the group, are not often attained. As with intuitivity and as with most artistic practice, polyrhythmic synergy is an uncommon event.

The Diagram and Intuition

The performative transduction of shared sensation is made manifest through intuition. Rhythm couples with the qualitative, heterogeneous multiplicity of duration and in this context, is not a calculable pulse but rather the ontogenetic relation between the terms of the beats. These movements of rhythmic duration can be accessed through intuition. In real time (*la durée*) collective composition, the performers synergise with these streams. Bergson’s method of Intuition can be applied here by easing the restraints of the philosophical concept¹³⁴ to facilitate its interference with the percept/affect.

For Deleuze, “every diagram is a spatiotemporal multiplicity” (2000, 34). Shaken from its Bergsonian roots, a spatiotemporal multiplicity is lived experience itself; the coexistent movements of perception and memory. Access to perception and memory as distinct tendencies or forces is only possible, according to Bergson, through intuition, as a means of moving through the virtual of which they are both a part in composite. The diagrammatic can be viewed as a method incorporating intuition to enter or intersect the virtual dimension. The diagrammatic is intuition moving in the affective strange loop; actualised, virtualised, reactualised:

[...] the diagram is highly unstable or fluid, continually churning up matter and functions in a way likely to create change [...] every diagram is intersocial and constantly evolving. It never functions in order *to represent* a persisting world but produces a new kind of reality, a new model of truth. (Ibid, 34-5)

As a conceptual method, intuition is division. It describes a way of looking past experience to the “articulations of the real” that can only be encountered by separating perception and memory, in their lived experience composite. Adapting intuition as an artistic (or scientific) methodology is not so straightforward as it refers to the production of concepts, and concepts, for Deleuze and Guattari (1994) are not the domain of art – percepts and affects are:

The representation has to be divided into the elements that condition it, into pure presences or tendencies that differ in kind [...] the brain does not manufacture representations, but only complicates the relationship between a received movement (excitation) and an executed movement (response). Between the two it establishes an interval [...] All that is left is to ask ourselves is what fills the cerebral interval (between received movement and executed movement), what takes advantage of it to become embodied? (Deleuze, 1991, 24-6)

According to Deleuze’s early inclinations, the intuitive concept produced from the overfull interval between brain function (received movement) and action (executed movement) involves interplay between *affectivity*, recollection and memory. The later thinking of Deleuze with Guattari consigns the intuitive concept to philosophy. The function belongs to science and the percept/affect to art. There is little chance of slippage or what Deleuze and Guattari call “interference” between these three planes.

Diagrammatic composition in KeyWorx provides a model for teasing out an intuitive method in the Bergsonian tradition, foregrounding processes of problematising, differentiating and temporalising. Clearly the rigour associated with these elements in building the philosophical concept is in no way equivalent to the work of the performing artist in an improvisatory situation. However we can, with some imagination, construe sympathetic relationships (*see Figure III.7*).

Problematising – in process philosophy this requires thinking beyond the dialectical; the movement of thought through virtual multiplicities and pluralities. The event of ‘prechoice’ in improvisation is a similar process, that singular affective

unity before the bifurcating split of selection; the continual provocation or response to change. A performer uses the commonsense understanding of intuition (spontaneous invention) to exponentially tap intuitive enaction.

Differentiation - distinguishing differences in kind from differences in degree. In KeyWorx technique both types of differencing are addressed. Differences in kind are most obvious and apparent in the diverse modalities of image, sound, text (as sound or image), and algorithm. They reflect qualitative change and heterogeneity. Properties of modalities are interconnected and quantitatively modulated by degree on a variety of scales e.g. 0 to 100hz, 0 to 127(midi), 0 to 32767ms, 0 to 100%, etc. The coupling of control parameters of different in kind modalities (e.g. sound frequency to color) executes intersensory change similar to synaesthetic effects.

Temporalising - intuition as a technique for intersecting multiple duration(s); for moving through the plane of immanence - "the nonthought within thought [...] the most intimate within thought and yet the absolute outside". (Deleuze and Guattari, 1994, 59). In translocal composing, intuitivity intersects multiple durations: the players, the media objects, the machines and the observers. The spatial coordinates of the players (in other rooms, cities) are proprioceptively in-formed in the inter-play. As architect Kenneth Knoespel remarks: "Rather than sequestering or policing the diagram in an axiomatic grid, Deleuze repeatedly emphasizes the way diagrams work to generate a kind of cognitive sweep that extend the possibilities of thought" (2001). In translocal diagramming, the cognitive sweep of distributed cognition is intuitive thought, felt temporality, an externalised affective looping with invisible realities; the sensation of sensation. It is, if fleetingly, the recognition of an authentic difference between perception and memory. A recognition of recognition.

The Diagram and the Catastrophe

Catastrophe is a condition of change in a dynamic system; cataclysmic shifts that result from incremental change in the parameters of the system over time; slow variables effecting fast variables; quantum leaps. Like intuition's simultaneous directionality between instinct and intellect, the catastrophic event occurs in the interstice between forces - a qualitative topological fold of instability between planes of equilibrium. The catastrophe, as reasoned by René Thom is simply the irreversible loss of homeostatic stability in a dynamic system. Small changes in the control parameters cause seismic shifts in the system. There is a discontinuous change of energy from one state to another. A quantum jump.

Catastrophic folds, in Deleuze's deviation from the mathematical proposition, condition the genesis of images and sensations. The catastrophe also conditions the destruction of the cliché. The catastrophic event jumps the instability of its folding. The emerging realities that surface from these movement forces are modal sensations that surprise. In this sense, the translocal potentialises a cusp catastrophe, an ontogenetic folding of two control factors and a behavioural pivot point, a singularity that maps an event interval between the stressful forces of the local and the global. Translocal composition assumes a diagrammatic potential that may leap unpredictably as metabolic and algorithmic control parameters vary. New images appear as other images transform and yet others disappear. The appearance of each fresh image is a micro-catastrophe. When Deleuze describes Francis Bacon's painterly diagram it is a one-dimensional catastrophe compared to the multidimensional genesis/destruction of a collaborative KeyWorx diagram which not only

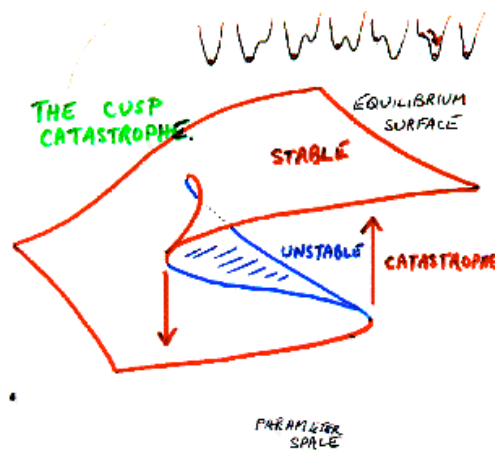


Figure 6.4: Illustration of a cusp catastrophe, one of seven catastrophes described by Thom. A cusp catastrophe has two mutually exclusive stable states. In the fold, a small change in a control parameter may lead to large change and a leap or flip to another state.¹³⁵

differentiates on multiple layers but in multiple individuations. Deleuze describes a Bacon catastrophe:

For example, we lengthen a mouth, we make it go from one side of the head to the other; we clean part of a head with a brush, a scrubbing brush, a sweeping brush, or a rag. This is what Bacon calls a Diagram; it is as if, all of a sudden, we introduced a Sahara, a Sahara region in the head; it is as if we

stretched over it a rhinoceros skin seen through a microscope [...] A Sahara, a rhinoceros skin, this is the diagram suddenly stretched out. It is like a catastrophe happening suddenly to the canvas, inside figurative or probabilistic data. It is like the emergence of another world. (2003, 81-82)

The folds of the desert, the rhino skin “inside figurative or probabalistic data” are produced on the layers (strata) of KeyWorx output. The same can be said of the montage output from other object-oriented programming languages used in performance such as Max/MSP/Jitter, pure data and Isadora. What differs in a KeyWorx ecology is the translocality of its implicitly deterritorialised framework and its multi-maker, transversality. It is as socially autopoietic as it is biologically (materially *of* the maker) sensational. The clear and obvious catastrophe in the artefact of KeyWorx output is conserved as a sensation; composition as a process of individuation. But that is a marginal event. *The product as by-product*. Deleuze continues:

The diagram is thus the operative set of asignifying and nonrepresentative lines and zones, line-strokes and color-patches. And the operation of the diagram, its function, says Bacon, is to be “suggestive”. (Ibid, 83)

But the true catastrophe, the leap of energy states, in a KeyWorx jam (aside from conventional, catastrophic hardware and software crashes) is affective. It takes place in the production of subjectivity in the connected players as they negotiate perception, memory and action in a chaomic social soup, continually stirred and transformed at variable speeds. *The catastrophe is in the interplay*. Preconceptions and preparations that harbor the cliché are subverted by the indeterminacy of the event; by the fluctuating speeds of duration, by contingencies implicit in the separation-connection; by the polyrhythmic variations in a panoply of interauthored control parameters. As images, sounds, texts are instantiated or generated they are recombined, transformed, redrawn and erased. Redrawn and erased at variable speeds and rhythms. The speed and rhythm of machine time, the speed and rhythm of the algorithmic operator, the speeds and rhythms of the human performers. Within the simultaneity of the genesis and destruction of performative modalities are the forces of local and global, of content and expression. See Figure 6.2. Deleuze and Guattari purport that the enemies of art are chaos and opinion. Art, according to them, continually struggles to transform the *chaotic* (a variability) to the *chaoid* (a variety). “Art takes a bit of chaos in order to form a composed chaos that becomes sensory” (1994, 206). This occurs on the plane of composition. Its potential is immanent to the event space of translocal interplay.

The Biogram and Translocal Performance

Massumi's ontogenetic, autopoietic *biograms*, can find aspiring "models" in real time, multimodal digital processing; in the lived experience of intersensory transformation. These are commonplace experiences for laptop VJ/DJ artists. They are also experienced in interactive installations that use, for example, parameters of sound (frequency, amplitude, spectral analysis) to control parameters of images and text (size, shape, colour, movement, position, rotation, etc.) resulting in image-sound transformation. In new media and LiveArts practice, fixed and dynamic correspondences between modal properties are routinely indexed and modulated, a common technique referred to as cross-media synthesis. Participation *may or may not* excite an accentuated, heightened intersensory experience but its classification as something other than metaphorical synaesthetic experience is debatable.

Though a biogram might be thought of as a specific synaesthetic topological form or object,¹³⁶ it is fundamentally a mode of being of the synaesthetic hinge-dimension. Massumi establishes his arguments for the biogram in his essay "Strange Horizon" (2002a, 177-207) in which he posits that the biogram is the *form experience* takes - "the "being" of the excess of effect over any determinate spatial configuration" (186).¹³⁷ An amalgam of perception and memory, repetitively repotentialising emergent becomings, the biogram registers the topological shapeshift of continuous change. Massumi uses several vectors to flesh out the biogram, amongst them Libet's half-second *gap* (covered extensively in Chapter Four) and spatial-sequence *synaesthesia*. Both are relevant to laptop jamming in networks and trans-local experience in general.

The RP gap: Recent neurological experiments dynamically alter the metrics of readiness-potential, the incipience of mindedness, with linearly causal anticipation. How might this evidence reflect the multiple and fluctuating latencies in network interplay? Some problematic implications of Libet's research have been speculatively posed here with respect to choice and chance in improvisation. What "happens" in the event-dimension of that interval? What occurs in the emergence differential of the "relational time-smudge" (Massumi, 2002, 196)? How does it happen that resonating, nonlinear dimensions subtract/select a linear action/reaction path and "go for it" - get actualised? Can this superlinear prechoice be called a diagrammatic redraw of yet to be actualised perception? As suggested in Chapter Four, Libet's latency can be extrapolated as a "spacetime" of Bergson's intuition and this has implications; implications for situating discourse on choice, chance and indeterminacy in performance practice in a virtual, biogrammatic bodyspace. The

biogram visualises the quasi-corporeal event potential both internal and external to the body. It implicitly acknowledges the biological matter of the body and the “matter” of felt thought as it shapeshifts and redraws its own reemerging. It is the in-between of the two-sidedness of affect; the edge of the coin that bleeds through sensory dimensions. In short, this experiential loop has to be a recursive topology. And this is the link to synaesthetic hinge-dimension posited by Massumi. This informal diagrammatic dimension is autopoietic, a future-past recursion of proprioceptive habit memory (future leaning) and memory-proper (past “images”). It is as much a “nonlinear temporality as it is a non-Euclidean space” (Ibid, 197).

Synaesthesia: Arguably, synaesthesia has three primary conditions: pathological,¹³⁸ physiological¹³⁹ and metaphorical. In its pathological or “idiopathic” (Cytowic) form, specific sensory modalities are ‘cross-wired’ in the brain resulting in modal fusions such that one can taste a sound or more typically, associate a specific color with a letter, number or word. Cytowic cites five conditions as necessary components of a true, clinical synaesthesia paraphrased below (2002):

- 1) Involuntary and automatic (elicited): synaesthesia is evoked at a preconscious sensory stage
- 2) Spatially extended: synaesthetes describe going to a certain “place” to examine a sensation
- 3) Consistent and generic: modal associations (e.g. “A” = red/orange) remain the same throughout life; the “forms” are simple (e.g. geometric shapes, hot, sweet, etc.)
- 4) Memorable: the added information of synaesthetic experience enhances memory; synaesthetes often have photographic (eidetic) memory
- 5) Affect-laden: generally pleasurable; laden with emotional affect

Cytowic is dismissive of artistically contrived uses of metaphor and sensory fusion. Idiopathic synaesthesia’s phenomenology “clearly distinguishes it from metaphor, literary tropes, sound symbolism, and deliberate artistic contrivances that sometimes employ the term “synesthesia” to describe their multisensory joinings” (Cytowic, 1995). *Metaphorical* synaesthesia, a language based association of sensory experience, has numerous varieties that overlap with the sensory couplings of clinical synaesthetes. These metaphorical couplings are often relegated to artistic invention, not qualifiably “involuntary”, yet “elicited” to some degree. There are several “usual suspects” frequently cited as probable synaesthetes: Kandinsky, Hockney, Nabakov, Rimbaud, Eisenstein, Baudelaire and Scriabin (Harrison, 2001). Having never been tested, their clinical credentials are unconfirmed. In fact, left-handed

women with colour hearing and colour-letter vision comprise the overwhelming demographic of certified synaesthetes (Cytowic, 1995), tainting the evidence of an all male gallery of great artists and composers.¹⁴⁰

Colour hearing is a visual-aural correspondence in which individual pitches (a B-flat, F-sharp, etc.) have a conjoined hue. The specific pitch-color pairings are unique and consistent to individual synaesthetes (e.g. reddish-blue for a B-flat, chocolate brown for an F-sharp). Concurrence among synaesthetes is uncommon. This is also true for colour-letter cross-referencing. Spatial-sequence synaesthesia, a special form of Cytowic's required spatial extension, is more rare. These synaesthetes see numbers, days of the week, months of the year, floating in specific locations and can point to them in space. "There is February." "Over there on the far-left is 72." This effect, this lived experience, involuntarily elicited, is a mnemonic device, adding another dimension of referencing. It maintains a consistent correspondence; 72 is always in the same location (and with colour-letter synaesthesia, always the same hue). In this respect it is also an orienting device. It is elicited from an informal sensory dimension between proprioception and vision through the spatial extension of words and numbers that enter the peri-personal space of the body, the space defined by the reach of our limbs.¹⁴¹ As the border between personal space and public space, peri-personal/kinesthetic space is a nonplace, it is translocal.

Research into cross-modal congruency, what is seen and what is felt in the immediacy of peri-personal bodyspace asks whether tool use, for instance, is incorporated into a bodily, corporeal schema or if, on the other hand, the brain extends its representation of the body into the external space of the tool. "It may be very difficult to separate the neural systems involved in representing the body itself from those that represent the space around the body" (Holmes and Spence, 2004). Spatial-sequence synaesthesia enters this discourse with a curious validation of a bi-ogrammatic loop that incorporates peri-personal objects such as language and symbols, as well as tools, into the body even as it extends that affected body into an actualised Euclidean space that is our experience of the world. This is the folding of experience into itself. The experience of quantitative spatial perception, objects positioned in space, folding into the movement of qualitative spatial perception. The exoreferential folding into the self-referential. This is the topological figure of the biogram. In this ontology, cross-modal congruency is synaesthetic cooperation that links sensory dimensions to each other. Dynamic cross-sense referencing produces the biogrammatic dimension of experience.

This leans towards the hypothesis that all experience is synaesthetically generated. The hinge-dimension of event perception is a very busy interstice, active in idiopathic synaesthetes and the rest of us. It would seem that visual/proprioceptive cross-referencing both stabilises and dislodges a sense of “place” which modulates between interference and harmony in sensory dimensions. In idiopathic synaesthetes and “normative” synaesthetes¹⁴² - the rest of us - visual/proprioceptive cross-

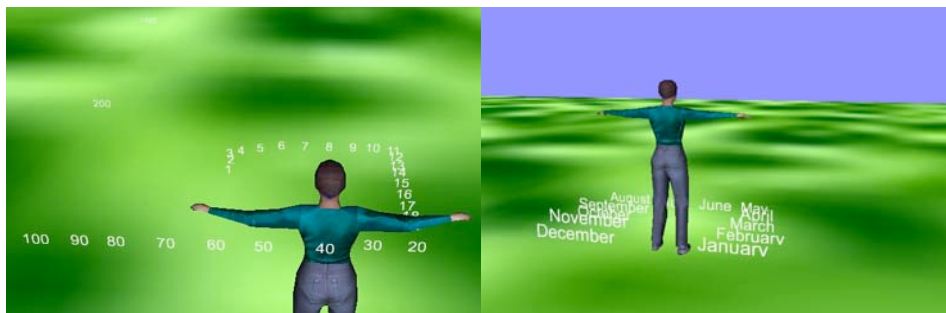


Figure 6.5a and b: Virtual reality images of spatial-sequence synaesthesia from David Eagleman's *Synaesthesia Research* site, mirrored in Cytowic's online *Synaesthesia Encyclopedia*.¹⁴³ Here, peri-personal and extra-personal space is defined by the outreach of the limbs. The feedback of symbolic and linguistic forms as sensory experience is clearly visualized.

modality both stabilises and dislodges that sense of “place” – visual and aural, visual and proprioceptive, etc. A translocal sense of “place” that arises from the transformation of sensory modalities in networked interplay has specific characteristics. Basically, the performing takes place in the kinesthetic space between the eye and the computer and the interface controllers. The experience of exoreferential or extra-personal space is secondary. For example, during the *Interfacing Realities* performance, performers in Rotterdam and New York only experienced each other in liminal, translocal space. The nonplace of the diagrammatic. Their attention was focused on dynamic sensory transformations occurring within a synaesthetic dimension in the armreach of laptop screen and controller-tools. The forces of local and global intersect with content and expression in one dimension and intersect with cross-referenced modalities on another.

Though synaesthetic forms and their spatial extension are often perceived as cartographic maps (*Figure 6.5a and b*), Massumi claims they are “lived diagrams based on already lived experience, revived to orient further experience. Lived and relived [...] They are event-dimensions combining senses, tenses, and dimensions on a single surface” (186-7).¹⁴⁴ This one-dimensional surface of visual sensation is a form of

experience that affectively interweaves between the virtual and the actual, the local and the global. Repeatedly. It directs an in-side stream for higher cultural forms such as language (letters, words) to flow into perception, re-emerging on the outside of actualized experience. Repeatedly. Higher cultural forms feed into recursive experience loops with sensory data. What this ultimately elicits is a grand loop in which experience becomes its own perception. "*Practice becomes perception.*" To this Massumi adds "The synesthetic hypersurface [...] is the hinge-plane not only between senses, tenses, and dimensions of space and time, but between matter and mindedness: the involuntary and the elicited" (Ibid, 190). Here we loop back, in a full body suit, to Libet's lag, to Varela's specious present, to Bergson's delay space of memory-image/centre of indetermination, to the diagram of the abstract machine. Here is the interstice, where all is resonation between between, an interrelation of relations. Here dualities and binaries (mind/matter, virtual/actual) simultaneously feedback and feedforward, becoming the multiplicities they are. *The synaesthetic hinge-dimension becomes **the** interval*; inclusive of an affective interval, of creative filtering, of intersensibility *and* a permeable "being there" of the skin's surface.

Perceptual Praxis: To return again to networked performance practice with artists hunched over laptop monitors, watching images morph to sonic textures, a synaesthetic hinge is not difficult to imagine. The lack of any Euclidean landmarks in a cyberspace encounter exerts a strong probability for the conditions of biogrammatic experience. What is seen is what is felt in the liminal, peri-personal space between the eye, the monitor and the tools. It's worth considering that the re-patterned, repetitive practice of modality correspondence in new media performativity, modulates a latent "normative" synaesthesia from background to foreground. This would not be classified as a metaphorical synaesthesia but the re-emergence of idiopathic synaesthesia, or a mutated version thereof. The biogram becomes a metaprocess: a process of processing, the noun becoming verb, the dimension becoming dimensioning, the relation becoming relationing. In other words, ***synaesthetic practice.***

Synaesthetic practice: The habit-memory of cross-referenced sensory relations in synaesthetic practice (e.g. sound amplitude changing the size of an image through the touch of a key, or mouse or tactile interface) is the same future-looking habit-memory that allows the memory-image of the past to fill that readiness potential gap between brain-matter-time and consciousness (Part Two). Differentiating between the habit-memory and memory-proper is another line of flight towards a biogrammatic shapeshift. As Grosz points out: "This is of course, precisely what hap-

pens in sleep, which severs the impetus of the perception from the requirement of action and can thus more readily tolerate the interposition of detailed and highly particular memory-images, which serve no practical function" (2004, 170). *Dreaming*. This relational time-smudge of the interval is future-past, the dissolve of a never present present; a there not there. "A body never coincides with its present. It coincides with its potential" (Massumi, 2002, 200) and that potential moves through the event-dimension of past and future. Libet's illusory backdating of brain triggered consciousness or Bergson's back-propagated spatial positions for that matter, provoke "an argument that there is no essential difference between perception, cognition and hallucination" (Ibid, 2006). If the synaesthetic fusion of modalities is hallucinatory, it is as 'natural' a function of the affective interval as any other type of thought. Massumi concludes: "The involuntary and elicited no-difference between cognition and hallucination can in turn be summed up in a single word - *imagination*" (201). And imagination, as we have earlier stressed, is *intuition*. *And intuition is biagrammatic*.

The loop comes back around, again, to performance processes of structured spontaneity: the sensory fusions integral to laptop jams and KeyWorx sessions, enabled by the modal mutability of the digital image, are diagrams produced from an abstract machine. "The diagram is potentially the very difference that emerges from the over turning of Cartesianism, transforming space from an emptiness into a modulating fullness" (Ednie-Brown, 2000). That modulating fullness is the biogram. And more. *Digijams* are diagrams in biograms in that they are topological events that re-emerge from their own emerging. They are openly, autopoietically affective. And more. They are distributed sensations, felt thought in collective composing. Transversally emergent. *The becoming nonhuman of affect*. The bit/byte as it leaps, catastrophically, between silicon and skin.

If improvisational composition, polyrhythmic diagramming, resonates sensation from the intensity of the creative event - an event potential not limited to networked performance practice but certainly amplified in it - then we have a means of describing the space of that resonance in the body. The biogram affords a transductive incorporeality from the translocal encounter and the intensively extensive affect that convolves expression and content in an emerging aesthetic.

Conclusion: The Concepts

Dynamic systems theories – physical, metaphysical, biological, social and technological – are models of transformation. Performance art systems have been included in this array. Specifically, live (real time), interauthored composition that is performed with and distributed by computers. What emerges from this style of translocal interplay is a processual aesthetic that is diagrammatic and biogrammatic, synaesthetically relational. The structure of this type of performative system resembles the ecologies (ecosophies) of other dynamic systems but has its own virtual organisation - its own shapeshift mechanisms and complex resonance. Enter an empirical, real, material nomadology that folds transversal concepts into a sensational mix; colliding intersections of incipient novelty. In the translocal event there is *interference*, an interstitial relation of affect, concept and function – a sensational, conceptual, algorithmic polyrhythm. Participation invites a dip into whirling pluralities of meaning. Representation takes a back seat to process.

Concept Remix

The concepts presented here are alternatives to arguments, assertions and claims: “The concept speaks the event, not the essence of the thing – pure Event...” (Deleuze and Guattari, 1994, 21). The concepts stipulated in the text can be identified as markers in a conflux of ideas spun out of an allegiance to dynamic networks. They will be addressed here with other concepts that emerged from the process of linking concepts. The generic depiction of translocal, polyrhythmic composition is intentional so as not to marginalise these concepts to experiences in one application only. That said, there are particular functions in KeyWorx and KeyWorx alone, as of this writing that establish grounds for biogrammatic event dimensions.

Concept 1: *The interplay of creative thought in the relational event dimension of translocal, polyrhythmic composition is intuitive. The emerging aesthetics are transversal.*

At first glance this concept appears banal, yet the unpacking of intuitivity has been arduous. An intuitive event is a rare occurrence. Bergson admitted as much. Nonetheless, it is the peg to hang a hypothetical hat on; the concept that recursively surfaces as link and lever to all other ideas distributed here (and there). In the performing arts, intuition has figured in methodologies of improvisation and spontaneity (Spolin; Boyd; Copeau). As an element of play and playfulness, it has acquired

aesthetic dimensions (Huizinga; Soules; Turner; Agamben) and is the motor of aléa-toric and indeterminate compositional processes. But perhaps most importantly, “*Play transforms structures into events*” (Mackenzie).

That aesthetics emerge in processual creation is a notion of Felix Guattari and underscores all efforts to fit the practice of multi-maker performance to his model of transversality, a processual subject’s movement in and through singular and collective territories, dimensions, realities. Though Guattari’s expectations are far more utopian than our practical experience of collaborative composition, his ideas evoke a credibly prescient anticipation of translocal creativity:

[...] every aesthetic decentering of points of view, every polyphonic reduction of the components of expression passes through a preliminary deconstruction of the structures and codes in use and a chaomic plunge into the materials of sensation. Out of them a recomposition becomes possible, an enrichment of the world (something like enriched uranium), a proliferation not just of the forms but of the modalities of being. (1995, 90)

Catalytic, synaesthetic, polyrhythmic, biogrammatic modalities in all their multivalent, anticipatory potential. Here is an intuitive splash between the speeding tendencies of instinct and intellect.

Concept 2: *Affect, through a process of individuation, is transductively distributed in translocal, polyrhythmic composition. The ‘space’ of affectivity must be quasi-corporeal, indeterminate and proprioceptive; internally resonate, externally vibrant*

The local or intensive resonance of an onto-topological affect that is virtual *and* actual is, in the translocal event, a *polyrhythmic resonance*. Guattari uses the term polyphonic, which in the context of translocal performance could describe the actualisation of the composition. In a performative context, the term *polyrhythmic* better suits. Polyrhythms are different in kind from polyphonies as duration differs from position, as the horizontal from the vertical, the smooth from the striated. It was Pierre Boulez who first distinguished the smooth and the striated, so influential to Deleuze and Guattari (1987,572). “[...] Boulez says that in a smooth space-time one occupies without counting, whereas in a striated space-time, one counts in order to occupy. He makes palpable or perceptible the difference between nonmetric and metric multiplicities, directional and dimensional spaces” (Ibid, 477). Polyphonies are complex multiplicities stopped in thought. Complex polyrhythms are suprametric, are of smooth space-time. Polyrhythmic resonance is the transductive

strange loop in the event dimension of translocal performance, inclusive of the rhythms of other makers and observers. Differentiated and individuated in the phase space of human and machine speeds and rhythms. Transversal, intuitive movement.

The 'coordinates' of the incorporeal intensities are exponentially redrawn (diagrammed) in a post-Deleuzian millennium that has absorbed the effects and affects of digital morphology; acquiesced to Reed's Law of group catalysis in networks. Affective intensity is evident in the performative composing of a translocal performance. It is evident in the creative filtering of the body's zone of indeterminacy; evident in the amodal completion of collaborative interplay; evident in the biogrammatic re-emerging of experience. In translocal interplay, the Euclidean space-place of geographic coordinates, of landmarks, of the physical presence of the other, takes a back seat to the duration of the non-Euclidean biogram. Intuition moves here (and there). Differentiated realities are transduced here (and there). Yet, it is also evident from the processes of interplay, from the doubly articulated strange loop of the expression and content, that the 'space' of the spatiotemporal composite of experience must be somewhere, in some singularity from which expression and content bifurcate and meld, bifurcate and jump the loop, bifurcate and meld. Where is that there (here)? The transductive mobility of the nonlocal finds its "centre" in indetermination, in the polyrhythmic, internal resonance of an affective interval. The nonlinear movement of that resonant echo, like reverberations in a mountainous cavern, needs walls to bounce off of, a consistency to interact with. The synaesthetic hinge dimension, a "place" emerging from consonant and dissonant modulations, transduces the corporeal to resonate. *Intensive affect*.

But surely it is not as relatively local, as that. That same transductive mobility, cycling through the virtual/actual in the dislodged, free spirited 'nonhuman becoming' of Deleuze and Guattari's affect/percept, is also evident as distributed affect in networked group composition. It is evident in indeterminate improvisational structures that actualise from the virtual potential of the *pure Event*¹⁴⁵; in the global movement of the absolute. Both worldviews, appear to be *becoming* in the situatedness of collective, translocal performance-making. *Extensive affect*.

Concept 3: *Intuition is transductively individuated in translocal, polyrhythmic, real time - la durée - composition. Variations of intuitive elements - problematising, differentiating and temporalising are intuitively (recursively, autopoietically) immanent to la durée composition (jamming).*

Intuition intersects, as Bergson stated and Deleuze underlined, other durations, other rhythms, in a guise of problem-solving. Transduction, Simondon's relay of thought movement is also intuitive "since it allows a structure to appear in a domain of problematics yielding a solution to the problems at hand" (1992, 314). This is the dynamic structuring of a methodology for improvisational group composition, for jamming. It asserts the movement of problematising as just that, movement. Movement through and with multiplicities, affiliation with contingencies, the 'it can always be otherwise' of plurality. Differentiating, another intuitive operation intrinsic to composing and interplay, coincides with Simondon's individuation that understands: "*the individual from the perspective of the process of individuation rather than the process of individuation by means of the individual*" (1992, 300). Multi-maker, co-created composition implicitly *intuits* the process of individuation in just this way and on three planes: the individuation of the autonomous participants, the individuation of the collective through the composing process and the individuation of the composition. Temporalising, the final operation of the intuitive method is, as previously indicated, the virtual event dimension (duration) of all translocal interaction. The transductive process of *intuiting* the method itself. Intuition is the processual movement of the connected composition.

Concept 4: *The composing in a co-operative KeyWorx translocal event is diagrammatic and synaesthetically biagrammatic.*

The process of "connected composing" is diagrammatic. In translocal jams it is the Sahara and the rhinoceros skin of the incipient catastrophe, the quantum leapfrog of the fold between the local and global; the catalytic processing and reprocessing of modalities. KeyWorx output, whether a single coloured moving pixel, a complex montage of interactive images and sounds, or a haptic polymorphic poetics, is nourished by the refrain. A felt territorialisation, a recognition. The diagram-biogram offers *potential* as a paradigm shift; the emergence of emergence in the oscillating excess of the involuntary and elicited. *That fullness resonates in the affective interval and in the distributed potential of eventness.* All the unformed, unorganised, intersocial functions that are a spatiotemporal multiplicity (Deleuze, Guattari) are the composing of a KeyWorx diagram. And that diagram, embodied and enacted internally as a quasi-phenomenological affectivity (Varela, Hansen) *and/or* a rhizomatically distributed affect (Deleuze, Guattari), is a becoming-biogram (Masumi), a synaesthetically modulating multimodality that connects to "*other people's minds*"¹⁴⁶ (Masumi, 2002, 188).

There is unsubstantiated evidence that latent, "normative" synaesthesia might re-

emerge through the repetitive patterning of multi-modal digital processing. This sensation grows acutely over time when there is a haptic correspondence between the transformations of sensory objects (e.g. touch of the keyboard to a sound amplitude parameter which changes image size). Arguably, an attenuated sensation can arise from a more passive observation (relationship between the beat and the pulsing image at a dj/vj party). The synaesthetic relation between modal sensations becomes, in Massumi's terms, an "intersensory hinge dimension." When this event dimension is shared, then something even stranger than synaesthesia potentially occurs. That bridged distance between other people's minds, is multi-directional. When we move through these concepts we arrive and depart and arrive once again at a Deleuzeguattarian ontology whirling like the wind through the body.

Diagramming is the movement of intuition. The biogram is the lived experience of this diagrammatic movement made sensational. In a KeyWorx event, there is the potential for a co-operative, relayed transduction of this hinge dimension. Might this intersensory hinge dimension be a portal, a wormhole, to the centre of indetermination? A non-Euclidean spacetime that loops through "other people's" durations?

***Additional Concept 5:** Deleuze and Guattari's trifurcation of creative thought (concept, function, sensation) is insufficient for translocal, composition in which intuitive algorithmic composing is synaesthetic percept/affect. Their concluding acceptance of interference, in particular, nonlocal interference is relevant. Nonlocal interference is the movement of intuition.*

In *What is Philosophy?* Deleuze and Guattari assert a triangulated paradigm that slices a cultural composite into the broad domains of creative thought: Philosophy, Science and Art. Each sector contributes a methodology from which the new and the novel can emerge. They state that for the philosopher it is the *concept*, for the scientist it is the *function*, for the artist, the *percept/affect*. These terms reside respectively (and irreducibly) on the plane of immanence, the plane of reference and the plane of composition (1994, 216). Though these distinctions are convincingly argued as differences in kind, and resonate effectively as generalisations, there are exceptions. Though Deleuze and Guattari make ample and eloquent concession to vagaries of a strict separation of planes, there remains a certain "monumental" attribute, the preservation of vibrations affixed to sensation in art that makes the slippage of one planar method to the next unlikely (Deleuze and Guattari, 1994, 211). This makes the ephemeral dissipation of sensation, the flickering overwriting of the digital diagram, more rare than it actually is. It positions the nonrepresenta-

tional, superlinear production and distribution of affect, central to performance art, as a fringe anomaly. These anomalies, these obvious exceptions are called *interferences* by Deleuze and Guattari and appear in the last three pages of the book either as a fresh concept - or a last gasp: "But what to us seems more important now are the problems of interference between the planes that join up in the brain" (Ibid, 216). One has the feeling, as they oh-so-briefly define three types of interference - *extrinsic*, *intrinsic* and *nonlocal* - that this concept arose from their differentiating journey through philosophy, science and art and they either simply ran out of steam or into the wall of another paradox. The book concludes abruptly on a deep inhalation with a short exhale.

Technologically mediated performances that combine the propositional (algorithmic) with the compositional (sensational), or the *diagrammatic*, are examples of creative processes. Translocal performances use scientific functions transparently (protocols, procedural code) and performatively (parameters modifications, filter processing) as conditions of play. Media arts genres that explore interrelations between the organic and the machinic, between humans and computers, have certainly matured since *What Is Philosophy?* was first published in 1991. Yet even contemporary theorists such as Lev Manovich (2000) ignore the incipience of process-based, real time, ephemeral composition. In the performing arts genre of translocal human-computer-human interaction, *chaosmosis*, posthumanism and transversality have been provocatively reified. The trifurcated distinction between the practices of philosophy, science and art is blurred in many instances of mediated, participatory, LiveArt performance.

Deleuze and Guattari find the brain to be the juncture for all three modes of thought. The concept, the function and the percept are intensities in these planes or horizons. The planes of becoming exist in simultaneity and are divided as differences in kind, giving them the credence, in Bergsonian parlance, of virtual, heterogeneous, multiplicities in duration. They are exteriorised *surfaces* between which intuition flows; between which energies are transduced - not synthesised or hybridised, they are co-operatively coextensive, meeting in the junction of the brain. And in that junction, is the anomaly of interference. It comes in three flavours:

Extrinsic interference: occurs when disciplines intersect domains and is actually quite common, such as philosophers creating "the concept of a sensation or function" (217) as all the cited theorists, including Deleuze and Guattari have done (e.g. Bergson's metaphysical construal of Riemann's multiplicities). In this interference, the disciplines retain their distinct methodologies.

Intrinsic interference: emerges from the plane of immanence as concepts “slip in among the functions [...] or among the sensations and aesthetic figures” creating a complex plane (Ibid).

Nonlocal interference: the relationship of each discipline with its own lack, its negative “the No that concerns it.” For example, “nonphilosophy is found where the plane confronts chaos. *Philosophy needs a nonphilosophy that comprehends it; it needs nonphilosophical comprehension just as art needs nonart and science needs nonscience*” (218). What is this? Have Deleuze and Guattari full-circled to the dialectical? To the excluded middle? To a negative ontology?

Extrinsic interference as we have shown is common, concurring with Deleuze and Guattari. As interference it does not further problematise the domain distinctions. Intrinsic interference is more complex, blurring distinctions in many instances. Deleuze and Guattari’s poetic writing style exemplifies this, as does conceptual art/performance art (Cage, Beckett, Nauman, Abramovic/Ulay, Acconci). Nonlocal interference specifically intersects the ideas posited here. It is the antithetical lack, conjoined with its significant other (immanence, composition, reference) in the wetware of the brain that things get interesting:

In this submersion it seems that there is extracted from the chaos the *shadow* of the “people to come” in the form that art, but also philosophy and science summon forth [...] nonthinking thought that lodges in the three, like Klee’s nonconceptual concept and Kandinsky’s internal silence. *It is here that concepts, sensations, and functions become undecidable, at the same time as philosophy, art and science become indiscernible, as if they shared the same shadow* that extends itself across their different nature and constantly accompanies them.” (Ibid, emphasis added)

These are the last lines of *What Is Philosophy?*, the last lines of Deleuze and Guattari. How did they arrive in the end at dialectic? At “No” place? Certainly this abrupt conclusion situates their argument in relation to the disorder and contingency of that overfull cerebral gap once again. That future-past that may be pre-intuitive potential; that may or may not catch the shadow of the three domains. What is intimated in this shadow of the “No planes” is a return to Bergson’s project; his important articulation of negation and its role in the intuitive method. For Bergson, effective problematising requires an understanding of the more and the less as different in kind, not different in degree. That, for instance, there is not less but

“more’ in disorder than in order because it is the idea of order *plus* its negation *plus* its motive.¹⁴⁷ When Deleuze and Guattari extract a shadow from a negation (chaos is a lack of order) does the double negative incite a positive ontology? If the shadow of interference is intuition (Bergson, 1992, 128) then a logic emerges. The interference composite could be considered the shadow of the translocal fold, intuition transduced between three thought vectors. A movement of self-varying felt thought. *Thought that differs from itself*. A shadow concept, not yet concrete, that feels the tendency of the downward pull of durational reflection with an upward tendency that surfaces in the real relations of material objects. Quantum forces creating a potential translocal interstice of smooth intuitivity.

Summation

The structure and organisation of dynamic transversal systems that are themselves assemblages of biological, sociological and technological systems which are themselves assemblages of objects (matter) and creative processes (mind), are ontogenetic and autopoietic. Forces or tendencies such as perception/memory, Euclidean/non-Euclidean, content/expression, instinct/intellect, local/global, produce emergent composites (experience, biogrammatic experience, meaning, intuition, the translocal respectively). The translocal is itself a generic in-between: a diagrammatic quantum leap, a field of potential, a biogrammatic hinge-dimension, a zone of indeterminacy. Sidestepping a vitalist interpretation of force as a unity, the multiplicity of diagrammatic affect is all phase-shift, all transductive individuating. Performance practice that open-ends to radical contingencies, co-operatively, as in various forms of group improvisation, transduces multiple planes of becoming. *The diagram is the aesthetic of collective composition. The aesthetic and the method*. The event of the passage of the relation into and through the form of expression and the form of content. Playful, unpredictable. The *biogram* is the lived intersensory experience of diagrammatic interplay. It is quasi corporeal transformation; synaesthetic, indeterminate. Translocal composition is situated in an in-between; in the movement of virtual-potential becoming actual becoming virtual-potential. Intuition on the move.

Conclusions: KeyWorx and Beyond

KeyWorx is a toolkit. As such, the 0.9 version described in this thesis remained in a perpetual beta state and was never marketed as a 1.0 product. As a software application, it enabled and facilitated real time compositional interplay for an elastic community of adherents. KeyWorx has been tested, played and performed with by an unknown number of users. Waag Society estimates hover at around 3500 downloads between 2000-2004; a modest yet substantial number given its word-of-mouth status, high learning curve and MacOS platform.

The evaluation of the experience of a small group of expert users is limited to artists with which I have had close contact; whose frustrations and exhilarations I have witnessed in the media lab in Amsterdam, in international workshops, master-classes and performance settings. Qualitative assessments of KeyWorx performative experiences vary as to the relative skill of the performers, the structural concepts of the artwork, instantiated media, available bandwidth, beta version and infinite exigencies of situated interplay. A qualitative “yardstick” with which to evaluate these diverse processes and *conditions of experience* is, at the outset, insufficient to the complexity of the task. The interviewees admit as much and were often unable to respond to questions with a generalisation (Doruff, 2005b). That said, a speculative consensus can be drawn from issues explored in this thesis to postulate some comprehensive findings

Based on the accounts of “expert users” (artists who have acquired technical and performative proficiency through an admix of persistence, patience and daring), certain patterns have emerged that are documented in the Appendices interview fragments (Doruff, 2005b). There is general agreement that:

- the temporal qualities (durations) of KeyWorx sessions are experienced in something other than clock time (see pgs. 255, 260, 264)
- the spatial experience is not referenced to the coordinates of the surrounding physical space of the performer, something I have termed a non-Euclidean spatial experience (references throughout)
- a synergetic creative, affective intensity can be generated, if only fleetingly, after an introductory build up of conceptual, functional and perceptual conditions are met through the shared processing of data; (the clocktime equivalent varies per session from one hour to twelve hours to reach this zone)

- real time compositional practice is cooperative and ethical; competitiveness is thus far unaccounted for or un-admitted to (Doruff, 2005b, pgs. 134-5)
- an unspoken trust between players is a necessary precondition for all (Ibid, pgs. 59, 87, 106, 135, 153)
- a sense of ritual “play” is often present

For example, artist Nancy Mauro-Flude (Doruff, 2005b) has elaborated on this ritualistic element in her performative methods in a paper delivered at Columbia University in Medellin in 2003¹⁴⁸:

I attempt to do this in an innovative way, using every possible medium to which I have access: live collaborative situations, performance, installation art, video, radio, sound, embodiment theory, using local/nonlocal/ translocal spaces via the internet. In my work, all of these dimensions and border zones are interconnected through a tendrillike system of veins, electromagnetic forces and flows. Like water eddies a stream these flow into one another, translate into one another, project shadows and light into all directions. Information trickles, spurts, suddenly breaks, foams away and is pitched into the great lake of memory, to eventually be retrieved and formed in my own particular way [...] *sister O* does this with her computer as a divination tool an extension of herself, that is not unlike the shaman rattle that I consider as a wireless communication device. Like the computer, the shaker has an antennae at the top, that you can detect certain electro magnetic forces with. I conducted connected session mediated through KeyWorx, this software is used as an extension of: performer, audience and environment. The shaker is a part of you!! It becomes a part of you. It gives you signs and omens, it is an oracle; also you have to listen to it. Like an internet/cable/wireless connection to the virtual world the feathers take you in to the magical realm/the virtual realm of visions. In Colombia the shaker is a personal thing - like a personal computer.

Michelle Teran concurs with this when she states: “when Nancy was in Columbia and Linda was in Sydney and we started at midnight and I completely lost touch with my surroundings, it was only like a few hours later, that I started to hear the birds chirp. It was like being part of a ritual” (see page 250). She also states:

So if you make something behave in an extraordinary way, that actually amplifies what you are participating in, which you take for granted. So a

social ritual really becomes sort of enhanced, you suddenly become very aware of what you're doing with your hands or how you're participating in that. Which is coming back to the whole discussion about technological amplifying a perfectly everyday ritual where everybody plays their parts. (Doruff, 2005b, 29)

Theoretical dimensions of practical experience

This research has drawn heavily on personal and peer-2-peer experience with networked performance structures. Its implications resonate outside the elusive boundaries of “net art” to include the dynamics of group improvisation in the performing arts as well as the social dynamics of play, communication and collaboration. Cooperative negotiations and shared sensations in collective making have been examined. The domain of translocal, multi-maker performance has been explored from a number of processual perspectives that include intuition, transduction, dia/biogramatics and transversality. Through a focused lens on a single enabling technology (KeyWorx) and a cross-section of artist experience, this thesis has sought to establish a conceptual platform for the further research of:

- emergent relational dynamics
- distribution of affect in the domain of networked technicity
- politics of ethical aesthetics in improvisational interplay; strategies of powerplay between expression and content
- sensations of polyrhythmic, synaesthetic composition
- affective intensity of peri-personal space in interface design and physical computing
- transdisciplinary interference; quantum and catastrophic improvisation
- “territorisation” of open networks as playing fields; analysis of gains and losses attributed to the commercialisation of the Internet and its symbiotic security constraints and abuses
- an ethics of disconnection, of “separation-connection”, a *whatever* belonging-together in newly entrenched localities

2 Web or not 2 Web? A question

It's important to reiterate that much has changed by way of worldview since the transitional swing of the millennium. KeyWorx was conceived in the ideological bubble of swelling techno-network utopias; a pre-9/11 glaze in which connectedness through data highways was a *sine qua non*; digital innovation inaugurated cy-

ber-stylised beliefs in fictive “connected” worlds. This PhD research was begun in 2002. The seas were turbulent but the ethical leaks didn’t threaten to sink the ship.

At the time of this writing, mid-2006, much has changed. Numerous peer-2-peer API’s (LimeWire, bitTorrent, Kazaa and forerunner Napster etc) have enabled the potential of community filesharing as have browser-based social networks (chats, de.licio.us, MySpace, YouTube, Blogger, MMORPG’s, Skype, etc). The open source software movement (FLOSS) and Creative Commons¹⁴⁹ have taken shared authorship seriously by “stablising” its trendiness in source code and legal processes. Comfortability among the young with synchronous and asynchronous data exchange through podcasts, mobile phone protocols (SMS, MMS, UMTS, GPRS, Bluetooth etc) lends an exponential curve to a flood of “we-centric” services being developed for telecoms by hardware/software developers. Once the domain of artists and quirky enthusiasts pushing the expressive content of digital communication towards the unforeseen, the sensed presence of “virtual” being-together has taken on viral qualities. The reification of social networking with digital toolkits is all but complete. This has ramifications.

The excitement of laptop interconnectedness that swept up, among others, Key-Worx users and developers in the first wave, is now in flux. The wired and wifi’ed, suffering the fatigue of information overload and 24/7 digital dependency, are waving reactionary fingers at interactive ubicomp. The ideological surge towards creative networks of the 90’s and early 00’s by artists and theorists has all but flat-lined to a tempered contraction from late capitalism’s inevitable hijacking of that momentum; of that surplus-value. The process itself has become a commodity. Critical and cultural theorists, Internet guru’s, artist developers and media institutes alike find their quotidian efforts pejoratively “collaborative” within the silicon panopticon of data surveillance by state, corporate and criminal monitors. Flying beneath the radar, RFID, biometric scanner and “packet sniffer” is increasingly unlikely. Sharing data, sharing almost anything, leaves digital tracks. Keystrokes, once the fundamental mechanism of communicative distribution, are routinely screened.¹⁵⁰ Daily enactment has become, ironically, incorporated. Affect Inc. Even Tim O’Reilly’s touted paradigm shift to Web 2.0, an Internet of interaction and social networks that replaces an Internet of media repositories, is greeted by heavy skepticism from Internet pundits¹⁵¹. The cooperative co-opted.

Tendencies

Within this phase-shifting, the long-term effect of multi-maker compositional experience is difficult to estimate. That a generation of artists is comfortable with technological failure as a feature of processual practice is certainly a development worth noting. The tolerance of an aesthetic that modulates the beauty of an artistically rendered “object” with the lived sensation of its processual rendering adds a further dimension to Deleuze and Guattari’s conservation of affect. That a group of artists became comfortable and facile with co-authored (no-authored, un-authored, inter-authored) practices is another notable development of the past decade. Indeterminacy and its random equivalent have become staples of algorithmically functional composition. The chaoid, immanent to KeyWorx performativity, flourishes in LiveArt practice.

Transdisciplinary interference patterns are increasingly frequent. For example, neurobiological and neurophysiological research on the affects of kinesthetic and synaesthetic performativity in networked interaction alluded to in this study provoke new artwork. Differential relations between space and time figure in the calculus of shared sensation as new technologies further modulate collective experience. Diagrammatic practice, by whatever name, informs it.

The more meaningful scenarios likely to emerge from practices affected by a committed engagement with KeyWorx and similar technologies will likely nourish the ethics of transversal encounters. As constraints and protocols change, so will the strategies and negotiations of powerplay/interplay. Significantly, the translocal, that vital yet vulnerable (non)relation between the tendencies of local and global may acquire a fresh, unpredictable mobility. The sway of the interrelation between local/global forces may be more volatile, more extreme. Or not. Tendencies tend to bifurcate.

Those artists who committed to dancing the in-between by exploring translocal jamming (in what one-day may be known as the first wave Distributed LiveArt era) may be in the political forefront of an ethical-aesthetic that individuates a second network paradigm. This will be the focus of my own research in the near future. As I continue to pursue my interest in creative processes I plan to engage with:

- the ethical situatedness of improvisation and its social contingencies in live performance including LiveArt, music, dance, theater and the digital arts resulting in a book with interviews from improvisors

- the performative politics of the translocal from a biagrammatic perspective
- an ontology of the polyrhythm
- the making of new work on a small scale

This thesis represents a formative step towards an increasingly focused inquiry of creative processes and their practice in the performing arts. The non-linear thought movements - over time - represented in these pages, from systems theory to the biogram, have evinced an ontology and a lexicon to recursively draw upon. The work of dedicated artists and thinkers, many of whom are referenced here, have provided invaluable vectors for further research.

Postscript: An Event

I was in London on the 7th of July, 2005, attending a PhD seminar for the SMARTlab cohort at Central Saint Martins, the University of the Arts, London. My colleague Anne and I had checked out of our hotel and were rolling our luggage towards Euston Station that morning, enroute to a meeting. As we entered the station, two policemen uttered a passing remark to people sitting in the too bright waiting room. A small group began rearranging themselves and their belongings to leave that sterile, uncomfortable place. In the main station hall, the sign overhead indicated the underground was closed due to a “power surge”. We wondered what a power surge was and how it could close down the tube. We joked that it was a euphemism for “out of service – broken again” or a nifty neologism for a rebellion. Walking through the station, we began our customary route down Endsleigh Road, towards Tavistock Square and Russell Square, a straight path to Central Saint Martins.

This morning, the city sounded different. There were many more people on the street, streaming from the station, apparently looking for alternate ways to get where they were going. It was chilly for a July morning and we stopped for a moment so I could pull a sweater from my luggage. We continued on our way. There was a significant police presence. Streets were cordoned off and police personnel in fluorescent yellow jackets were directing the flow of auto and pedestrian traffic as that normally tranquil street, by the park, was swollen with excess commuters. There was no anxiety, just a heightened sense of purpose, a faster pace, a pushy rhythm. There was, upon reflection, an amplified sense of expectation, a non-qualifiable yet palpable event potential, a surfeit relationality of all things to all things, due in part to the shift in quotidian ordinariness, due in part to the shared sensation of movement.

We crossed the intersection at Euston Road. I remember a woman holding a mobile phone high over her head, apparently recording the stream of people and the police and that palpable sense of anticipation and disjunction in the collective movement. I recall thinking it was a strange scene to capture. I turned around to look at her again as we passed by. She was intently focused on her recording, on images she couldn't see as they paraded above her head on the tiny monitor. We walked on. We weren't rushing, just keeping pace. We weren't talking much.

As we neared the park there was, suddenly, a huge bang (how huge?); an image of a bang. About seventy meters (how many meters?) in front of us, on the opposite

side of the street, smoke and debris blew high (how high?) into the air. A long strip of twisted steel, glittering from the sun's reflection, propelled upwards in a slow float like a helium balloon. A movement-vision - "a vision that passes into the body and through it to another space" (Massumi, 2002a, 57). In quantifiable time perhaps five, six seconds passed between the percussion of the bang and the last bits of debris falling to the street. In the experience of event non-time it was a "substanceless and durationless moment"; a vacuous hole in the present. The preceding past and the succeeding future, in the experiential composite of perception and memory, were severed by the event and the present emptied; an intuitive moment as perception and memory differentiate.

I don't recall thinking "it's a bomb." I perceived an explosion. I understood it was a bomb. Patterned media memory. Cherry bombs, pipe bombs, car bombs, bus bombs, roadside bombs, airplane bombs, building bombs, atom bombs. I *felt* a sound/image spectacle, as the long, twisted thread of the roof of the bus hung and shimmered in the air with the muted resonance of the metallic bang. I thought "my god the people" but as an abstraction. The maximally abstract yet real. The virtual. The movement of differentiating memory (those repetitive media loops of explosions and their effects) and vivid perception. The intensive sensation of the overfull sensorimotor present and the emptied event. My 'now' as 'future-past', as a felt sensation of phase shift. The whirling, disembodied percept and affect, collectively out there in the metallic shards and reverberant in here, in some quasi-space of my body matter that I could not then name. Intuition transducing to other realities, other dimensions. It's something rarely felt outside of a creative process - that sensation of affect.

Anne and I remained calm (frozen?) as people nearer the bus ran towards us screaming, escaping. We moved, after some moments (how many moments?), but we were somehow wavering. Instinct, intellect - neither kicked in. We delayed. The timeless event swelling like a wormhole, modulating between empty and overfull. Intuition moved through us as a contingent sensorimotor 'choice' in the differentiating event of chaotic order that could have always been otherwise. "Intuition is a bifurcating contingency; a line of flight that ripples and multiplies, looping through the virtual to the actual and back again to the virtual through the chaos of order and order of chaos." I wrote that once; earlier (page 82). The felt thought of problematising, differentiating, temporalising. The body moves backwards to safety; moves forward to help; stands still or circumnavigates to... orient? To choose? Was this, in hindsight, the intensity of a biogrammatic cross-referencing between vision and proprioception? The felt folding of the quantitative space in front of me re-

emerging with the qualitative space of my movement-vision? Could this have been the topological form of lived experience as a kind of bas-relief?

We walked back towards Euston Road and around the block. Then through the park at Tavistock Square to where the bus stood. Why? There was nothing like a rational intellect calculating possibilities. Perhaps instinct was driving; but it might have propelled us in a fixed direction forward or backward. We were in an event dimension, in a continuity of duration, heterogeneous yet indivisible, our realities (durations) intersecting with a multiplicity of other durations, living and dying. As we approached the sidewalk opposite the front end of the bus we stood still (for a moment?). I was enveloped in silence. A black hole of silence. No screaming, no talking, no birds, no wind, no cars, no sirens (yet). *The event as an anechoic chamber, a momentary space of intensive echo.* Unlike Cage's transformative experience in an anechoic chamber, a soundproof room where he famously heard his nerves whistling and his blood pulsing, I only heard myself hear silence. Feel the internal resonance of silence. The sensation of the sensation of silence.

A policeman's scream, directed at us, eluded the vacuum that sucked that silence through me and into the 'being there' of that place. An hysterical "Run away, run away! There are guns!" (or "There are *bombs*?") I didn't hear his words well as they crashed the silence, shattered that timeless, virtual interval. We were then positioned there, at fixed coordinates on a global map, at a clock stroke. Once again, in the space-time continuum of lived experience. The discontinuous change of the catastrophe. A hesitant intellect or instinct, I'm not sure which, moved us back through the park, the wheels of our luggage bumping over the grass beneath our feet.

The *pure* event, is what Massumi calls "the in-itself of transformation." It is beyond experience, "out the far side of quasi-corporeality." Looking back, I wonder how I can recount this event as anything other than a paradoxical distinction. How can I recount this event as *felt*. I still question this.

Endnotes

¹ <http://mathworld.wolfram.com/Bifurcation.html>

Stephen Wolfram is a well-known complexity scientist and author of *A New Kind of Science*, 2002, Wolfram Media, Inc. and *Mathematica*. <http://www.stephenwolfram.com/>

² “The Möbius strip, also called the twisted cylinder (Henle 1994, 110), is a one-sided nonorientable surface obtained by cutting a closed band into a single strip, giving one of the two ends thus produced a half twist, and then reattaching the two ends.” And “The Klein bottle is a closed nonorientable surface of Euler characteristic 0 (Dodson and Parker 1997, 125) that has no inside or outside. It can be constructed by gluing both pairs of opposite edges of a rectangle together giving one pair a half-twist, but can be physically realized only in four dimensions, since it must pass through itself without the presence of a hole [...] It can be cut in half along its length to make two Möbius strips (Dodson and Parker 1997, 88), but can also be cut into a single Möbius strip (Gardner, 1984, 14 and 17).”

<http://mathworld.wolfram.com/MoebiusStrip.html>

<http://mathworld.wolfram.com/KleinBottle.html>

³ http://crossfade.walkerart.org/brownbischoff/hub_texts/simple_deg_f.html

⁴ Illustration from the Exploratorium Museum published at:

<http://www.exploratorium.edu/complexity/CompLexicon/catastrophe.html>

⁵ “Polyrhythm is the simultaneous sounding of two or more independent rhythms. A simple example of a polyrhythm is 3 evenly-spaced notes against 2, with the 3-beat pattern being faster than the 2-beat pattern, so that they both take the same amount of time. Other simple polyrhythms are 3:4, 4:3, 5:4, 7:4, etc. Another form of polyrhythm, which might also be termed polymeter, would be phrasing to suggest a different meter than the one being played by the rest of the ensemble. A common example of this in jazz would be phrasing quarter notes in groupings of 3 to suggest 3/4 time while the ensemble plays in 4/4. Compare with hemiola (not a polyrhythm). Traditional African music is heavily polyrhythmic, although, unlike below, the downbeats do not usually coincide.” <http://en.wikipedia.org/wiki/Polyrhythm>

⁶ The band was called *Care of the Cow*, chosen from the *I Ching* by a chance operation. Two albums and one cassette were produced and distributed through the New York’s New Music Distribution Service.

⁷ The “Body without Organs”, or the “BwO” was a term originated by Antonin Artaud which first surfaced in the last lines of *Pour en finir avec le jugement de Dieu*:

“est c’est alors
que j’ai toutfait éclater
parce que’à mon corps
on ne touche jamais.”

Deleuze first uses the term in *The Logic of Sensation*: "beyond the organism, but also at the limit of the lived body, there lies what Artaud discovered and named: the body without organs. "The body is the body/ it stands alone/ it has no need of organs / the body is never an organism/ organisms are the enemies of bodies." (Antonin Artaud, "The Body is the Body" trans. Roger McKeon, *Semiotext(e)* 2, no 3 (1977), 38-39 In: Deleuze, 2003, 39)

⁸ "[...] the transmission of an impulse of virtuality from one actualization to another and across them." (Massumi, 2002a, 42)

⁹ "Only that which differs in kind can be said to be pure and only *tendencies* differ in kind. The composite must therefore be divided according to qualitative and qualified tendencies, that is the way in which it combines duration and extensity, as they are defined as movements, directions of movements..." (Deleuze, 1991, 22-3)

¹⁰ "If meaning is a process of translation from one substance to another of a different order and back again, what it moves across is an unbridgable abyss of fracturing. If meaning is the in-between of content and expression it is nothing more (or less) than the being of their "non-relation." (Massumi, 1992, 16)

¹¹ For a treatment of Ruyer's influence on Deleuze and Guattari see Paul Bain's "Subjectless Subjectivities" - "The absolute surface (or volume) know itself without observing itself." (Bains In: Massumi, 2002b, 111). And, "Absolute survey is a frameless vision that grasps the entire visual field in a single instantaneous take [...] the absolute surface materializes a different kind of "image" than that of a photograph or cinematic shot. It is not an objective, technical image observable at a distance, but a dimensionless, subjective "image" that, as Bill Viola has pointed out, can be experienced only internally, within the body of the sensing organism itself." (Hansen, 2004, 175-6)

¹² "Real time" is a familiar term in IT, CSCW and new media but it is generally understood to be metrical time experienced without latency, ergo naturally. In the context of this paper it is meant as non-linear, non-metrical, qualitative continuity of duration.

¹³ Deleuze and Guattari's reference to Hjelmslev's distinctions: "The first articulation concerns content, the second expression. The distinction between the two articulations is not between forms and substances but between content and expression, expression having just as much substance as content and content just as much form as expression" (1987, 44)

¹⁴ In an ironic example of right wing parlance intersecting empirical virtuality, Katherine Hayles has picked up on US Defense Department vernacular in her paper "Narrating Bits: Encounters between Humans and Intelligent Machines". Donald Rumsfeld: "As we know, there are known knowns. There are things we know we know. We also know there are known unknowns. That is to say, we know there are some things we do not know. But there are also unknown unknowns, the ones we don't know we don't know" (Department of Defense news

briefing, February 12, 2002), cited in "The Poetry of D. H. Rumsfeld" by Hart Seely, <http://slate.msn.com/id/2081042/>. (Hayles, 2004). Comment: The fact that "unknown knowns" are left out of the schema is telling and ample commentary on the state of political affairs this thinking has wrought.

¹⁵ Ten interdisciplinary conferences were held between 1946 and 1953 under the heading Cybernetics-Circular Casual, and Feedback Mechanisms in Biological and Social Systems. They were significant scientific events in a post World War II landscape. Concepts such as "information", "feedback" and "autopoiesis" were initiated towards the development of a universal theory of systemic control applicable to biological, economical, sociological and technological "machines".

¹⁶ "Catalysis involves *resituating* variation - a very different proposition from contextualizing things." (Massumi, 2002a, 174)

¹⁷ We use Cary Wolfe's definition compiled from Varela's terms: "The full definition of "embodiment" then, is a self-referential, self-organizing, and nonrepresentational system whose modes of emergence are made possible by the history of structural coupling between the autopoietic entity and an environment to which it remains closed on the level of organization but open on the level of structure." (Wolfe, 1998, 60-1)

¹⁸ "Image as it is used by Bergson and Deleuze: The co-existence rather than integration of perception and memory brings Bergson to develop, in *Matter and Memory*, a peculiar conception of matter as the aggregate of images, whereby image he understands "a certain existence which is more than that which an idealist calls a representation, but less than what a realist calls a thing --an existence placed halfway between the "thing" and the "representation." The image is therefore neither purely mental nor purely external to the mind, but somewhere in between." (Borrodori, 1999)

¹⁹ "A haecceity has neither beginning nor end, origin nor destination; it is always in the middle. It is not made of points, only of lines. It is a rhizome." (Deleuze and Guattari, 1987, 263)

²⁰ Grosz has made this comment: "In the universe as a totality, there are no closed systems. The influence of each event, even at the most local level, may have ramifications and effects on many diverse events that may eventually reach to the furthest parts of the cosmos. In this sense, Bergson may be seen as a predecessor of contemporary complexity theory. This complex totality of materiality, this cosmological duration is that which coincides with our own duration whenever we are obliged to use, that is isolate, the particular properties of matter for our purposes." (2004, 199)

²¹ "An autopoietic machine is a machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components which: (i) through their interactions and transformations continuously regenerate and realize the network of proc-

esses (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in space in which they (the components) exist by specifying the topological domain of its realization as such a network." (Maturana, Varela, 1980, 78)

²² Guattari's term *transversal* appears throughout this thesis. It can generally be understood as a production of subjectivity that includes technological, institutional, artistic, cultural dimensions. "The key concepts involved are: *mobility* (transversing domains, levels, dimensions, the ability to carry and be carried beyond); *creativity* (productivity, adventurousness, aspiration, laying own the lines of flight); *self-engendering* (autoproduction, self-positing subjectivity) territories from which one can really take off into new universes of reference." (Genosko, 2002, 55).

²³ From an interview with David Reed in the online *Journal of the Hyperlinked Organisation*: "Group forming is, in my opinion, the technical feature that most distinguishes the Internet's capabilities from all other communications media before it. Beyond either the hub-and-spokes broadcast networks of print, television, and radio, or the peer transactional networks of telegraph, telephone, and online financial transactions, the Internet's architecture also supports group-forming networks whose members can assemble and maintain persistent communicating groups." <http://www.hyperorg.com/backissues/joho-jan19-01.html#reed>

²⁴ "An abstract machine in itself is not physical or corporeal, any more than it is semiotic, it is diagrammatic (it knows nothing of the distinction between the artificial and the natural either). It operates by matter not by substance, by function not by form. Substances and forms are of expression "or" of content. But functions are not yet "semiotically" formed, and matters are not yet "physically" formed. The abstract machine is pure Matter-Function - a diagram independent of the forms and substances, expressions and contents it will distribute." (Deleuze&Guattari, 1987, 141)

²⁵ "Current continental philosophy contends that the human is necessarily bound up in an originary technicity; technology is a constitutive prosthesis of the human animal, a dangerous supplement that enjoys an originary status." (Pearson, 1997, 123 in: Mackenzie, 2002, 3)

²⁶ Two definitions of ontology:

1. "The fundamental categories of what sorts or kinds of things there are in the universe. At one level of analysis, tables and chairs might be considered to be distinct kinds of things; but for the purposes of ontology, tables and chairs are (usually regarded as being) the same sort of 'thing', namely physical (or spatiotemporal) entities. Other 'fundamental' sorts of things which have been proposed by various philosophers at one time or another have been: sets (or classes), propositions, facts, states of affairs, universals, numbers, causal connections, forces, substances, souls, minds, spiritual beings, ethical values, purposes, etc." (Swartz, 2001) http://www.sfu.ca/philosophy/beyond_experience/glossary.htm

2. From a DARPA glossary: "An explicit formal specification of how to represent the objects, concepts, and other entities that are assumed to exist in some area of interest and the rela-

tionships that hold among them." <http://dli.grainger.uiuc.edu/glossary.htm>

²⁷ The term "possibility" marks an important distinction between scientific and philosophical thinking. Bergson and Deleuze after him, classify possibilities as the effects of reality. Within an emergent context, "potentialities" would be appropriate.

²⁸ Simondon is the conceptual precursor of the ontogenetic relation. He explores the in-between of the relative and the quantum, positing that: "The relation, then, represents one of the modalities of the being since it is contemporaneous with both of the terms whose existence it underwrites. A relation must be understood in its role as a relation in the context of being itself, a relation belonging to the being, that is, a way of being and not a simple connection between two terms that could be adequately comprehended using concepts because they both enjoy what amounts to an independent existence." (1992, 316)

²⁹ <http://mathworld.wolfram.com/Bifurcation.html>

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³⁰ Deleuze distinguishes two types of differencing - differentiate refers to the virtual planes while differentiate refers to their actualization: "Thus, with actualization, a new type of specific and partitive distinction takes the place of the fluent ideal distinctions. We call the determination of the virtual content of an Idea differentiation; we call the actualization of that virtuality into species and distinguished parts differentiation. It is always in relation to a differentiated problem or to the differentiated conditions of a problem that a differentiation of species and parts is carried out." (1994, 258)

³¹ Applications such as Max/MSP/Jitter, pure data, SuperCollider, Isadora and KeyWorx support this type of interaction.

³² Thom's theorem was influential in the 60's and 70's as a precursor to chaos theory. His seven potential catastrophic topological forms are defined by four input and two output parameters that disrupt the stable state of a system. Four of these are the fold, the cusp fold, the butterfly and the parabolic umbilic catastrophe. Thom's attempted to develop a general theory of biological form from a topological premise that was of limited complexity.

³³ Similar to Erving Goffmans shifting presentations or performances of self. (1959)

³⁴ "[Metcalfe's law](#) states that the total value of a good or service that possesses a network effect is roughly [proportional](#) to the square of the number of customers already owning that good or using that service." http://en.wikipedia.org/wiki/Network_effect

³⁵ "But early cybernetics is essentially concerned with feedback circuits, and the early cyberneticists fell short of recognizing the importance of circularity in the constitution of an identity. Their loops are still inside an input/output box. In several contemporary complex sys-

tems, the inputs and outputs are completely dependent on interactions within the system, and their richness comes from their internal connectedness. Give up the boxes, and work with the entire loopiness of the thing. For instance, it's impossible to build a nervous system that has very clear inputs and outputs."(Varela, 1995)

³⁶ "The Möbius strip, also called the twisted cylinder (Henle 1994, 110), is a one-sided nonorientable surface obtained by cutting a closed band into a single strip, giving one of the two ends thus produced a half twist, and then reattaching the two ends." And "The Klein bottle is a closed nonorientable surface of Euler characteristic 0 (Dodson and Parker 1997,125) that has no inside or outside. It can be constructed by gluing both pairs of opposite edges of a rectangle together giving one pair a half-twist, but can be physically realized only in four dimensions, since it must pass through itself without the presence of a hole [...] It can be cut in half along its length to make two Möbius strips (Dodson and Parker 1997, 88), but can also be cut into a single Möbius strip (Gardner, 1984, 14 and 17)."

<http://mathworld.wolfram.com/MoebiusStrip.html>

<http://mathworld.wolfram.com/KleinBottle.html>

³⁷ "The plane of consistency, or planomenon, is in no way an undifferentiated aggregate of unformed matters, but neither is it a chaos of formed matters of every kind." (Deleuze and Guattari, 1987, 70)

³⁸ Cary Wolfe gives a rigorous comparative analyses of system theory and poststructuralism from a pragmatic context in *Critical Environments: Postmodern Theory and the Pragmatics of the "Outside"*, 1998. Though he does not specifically address Bergson, many of Deleuze's fundamental concepts spring from his thought.

³⁹ Acknowledging that "poststructural" is a problematic term and unfairly designates a fuzzy and contested relation to some thinkers who would otherwise object to its clarity or usefulness, it nonetheless offers an alternative to 'structuralism', a thinking beyond the limits of the structural. This genre of cultural analysis will sometimes be labeled nomadic or diachronic thought in the course of this thesis.

⁴⁰ Husserl was a contemporary of Bergson. Their interests, particularly in the exploration of Time and temporal perception were resonant. A comparative analysis of Husserlian time consciousness and Bergsonian duration is beyond the scope of this thesis however. Primary source material: Husserl, E., 1964. *The Phenomenology of Internal Time- Consciousness*. Martin Heidegger, ed., and James S. Churchill, trans., Bloomington, Indiana University Press. Secondary source conference paper: van Gelder, Tim, 1995. "Wooden Horse? Husserlian Phenomenology Meets Cognitive Science," for the conference "Actualite De La Phenomenologie Husserlienne: Les Defis De La Naturalisation," Bordeaux, France.

⁴¹ This phrase from Massumi captures the distinction between passage and position that Deleuze and Guattari term *smooth* and the *striated* space. *Striated space* alludes to the Euclid-

ean geometry and Cartesian coordinates of Bergson's 'actual' multiplicities (discrete space) whereas *smooth space* is continuous and fractal (heterogeneous). It is in smooth space that becoming 'becomes'. Progress, however, occurs in striated space. (Deleuze and Guattari, 1987).

⁴² From Wolfram's Mathworld: "A Riemann surface is a surface-like configuration that covers the complex plane with several, and in general infinitely many, "sheets." These sheets can have very complicated structures and interconnections (Knopp 1996, pp. 98-99). Riemann surfaces are one way of representing multiple-valued functions..." <http://mathworld.wolfram.com/RiemannSurface>

⁴³ Deleuze will later call the "real" the "actual".

⁴⁴ Deleuze and Guattari in distinguishing methods between science, philosophy and art have said: "Concepts and functions thus appear as two different types of multiplicities or varieties whose natures are different. Although scientific types of multiplicity are themselves extremely diverse, they do not include the properly philosophical multiplicities for which Bergson defined a particular status defined by duration, "multiplicity of fusion," which expressed the inseparability of variations, in contrast to multiplicities of space, number and time, which ordered mixtures and referred to the variable or to independent variables." (1994, 127)

⁴⁵ Pragmatic process philosophies practiced by James, Whitehead, Peirce and Bergson are finding revalidation in the emerging field of Process Physics research, populated by a small coterie of maverick scientists rejecting geometrically modelled time and favoring processual time modelled only on itself. The foundational turn of Process Physics could be seen as an invigoration of Bergson's commitment to asymmetrical time and space.

A description of the tenets of Process Physics: "In Process Physics time is a distinct nongeometric process while space and quantum physics are emergent and unified. Quantum phenomena are caused by fractal topological defects embedded in and forming a growing three-dimensional fractal process-space, which is essentially a quantum foam [...] process physics arrives at a new modelling of time, process time, which is much more complex than that introduced by Galileo, developed by Newton, and reaching its so called high point but deeply flawed Einstein spacetime geometrical model. Unlike these geometrical models process-time does model the Now effect. *Process physics also shows that time cannot be modelled by any other structure, other than a time-like process, here an iterative scheme.* There is nothing like time available for its modelling. The near obsession of theoretical physicists with the geometrical modelling of time, and its accompanying notion of analytical determinism, has done much to retard the development of physics. *The success of process physics implies that time along with self-referencing is in some sense prior to the other phenomena, and certainly prior to space...*" (Cahill, 2003, 2 emphasis added) Published online:

<http://xxx.lanl.gov/abs/physics/0306196>

⁴⁶ "Prigogine and Stengers point in this direction when they recommend that science be as mindful of its failures as its successes. Their work shows that scientists' attempts to treat all

processes as theoretically reversible processes have failed to account for the results of many experimental investigations. Although our ability to control the world might be maximized if we could always apply the homogeneous form of practical thought and then explain all results in terms of external, physically alterable relations between isolated entities or stages of processes, we find that all available data cannot be made to conform with this ideal scheme. This reluctance of the world to conform perfectly with our plans permits the results of scientific examinations to be sources of disinterested as well as practical knowledge. But to understand the significance of this incongruence for the disinterested knowledge of nature, we must pay close attention to the structure of practical thought and its role in scientific method. The insights attained through Bergson's philosophical reflection upon this structure should not be ignored." (Szendrei, 1989, 181-193)

⁴⁷ An excerpt from an interview by Asada Akira:

"Asada: I believe that you mentioned somewhere that you read Bergson when you were young and this inspired you to begin thinking about the question of time. Could you tell us something about what Bergson meant to you?

Prigogine: Bergson and Heidegger have to be understood in the perspective in which there is no other science except Newtonian science. And that led, as you said yourself, to the dichotomy of the two cultures. And Heidegger and Bergson are examples of this split. Therefore, the critical part of Bergson and Heidegger is still very interesting. But the constructive part is, in my opinion, a little out of date. They thought that only metaphysics could answer the problem of time and brought out these vague notions of "duree." All of this philosophy was very interesting and I very much enjoyed reading it, and it has encouraged me to pursue my role better. But I am no longer interested in the metaphysical parts. Bergson had a debate with Einstein in which I thought that Einstein was mistaken but that Bergson's position was itself virtually meaningless.

Asada: Our mutual friend and your co-author Isabelle Stengers takes a position very close to that of Deleuze. What do you think of Deleuze, who might be said to be in the same tradition as Bergson?

Prigogine: I read several of his works and found them quite interesting, but quite frankly there was quite a bit that I did not understand. In my opinion, there is little to be gained from trying to rethink metaphysical concepts like Bergson's "duree." Science today has surpassed Newton and Einstein and reached a level where we can think of the problems of time and creation in more flexible, if still analytical, ways. For me this is the more interesting route." (1998, 5-6)

⁴⁸ "As a neuroscientist investigating these issues for more than thirty years, I can say that these subjective phenomena are not predictable by knowledge of neuronal function. This is in contrast to my earlier views as a young scientist, when I believed in the validity of determinist materialism. That was before I began my research on brain processes in conscious experience, at age 40. There is no guarantee that the phenomenon of awareness and its concomitants will be explainable in terms of presently known physics. In fact, conscious mental phenomena are not reducible to or explicable by knowledge of nerve cell activities. You could look into the

brain and see nerve cell interconnections and neural messages popping about in immense profusion. But you would not observe any conscious mental subjective phenomena. Only a report by the individual who is experiencing such phenomena could tell you about them [...] scientists and philosophers appear not to realize that their rigid view that determinism is valid is still based on faith. They really don't have the answer." (Libet, 2004, 5-6)

⁴⁹ "Always on panopticon" is a phrase from Howard Rheingold's last chapter in *Smart Mobs*, that depicts 24/7 surveillance of all things connected, from personal computers to mobile phones, through a Big Brother lens borrowed from Foucault's notion of panopticism in *Discipline and Punish*. (2002, 189)

⁵⁰ J. J. Gibson's ecological psychology that coined the term "affordances" for environmental "objects" that can be acted upon was focused on coupling vision with action. Interfacing motion detection and location-aware technologies extend this notion to the unseen.

⁵¹ This description may become increasingly implausible as the Internet commercially reconfigures and top-down structure circumvent its original premise.

⁵² Nettime is a mailing list "for networked cultures, politics and tactics."
<http://www.nettime.org/>

⁵³ For more on this topic see Lacan, Jacques, 2001. *Ecrits*, trans. Alan Sheridan London, Routledge, and also Stern, Daniel, 1985. *The Interpersonal World of the Infant*, New York, Basic Books

⁵⁴ For a visualization of this behavior see Mitch Resnick's simulation in NetLogo, a free application with an active community out of Northwestern University that supports simulations of changing conditions over time. The slime mold simulation can also be run in a browser < <http://ccl.northwestern.edu/netlogo/models/Slime> >

⁵⁵ "To put the point another way: the intersubjective openness of consciousness and empathy are the preconditions for our experience of inhabiting a common, intersubjective, spatial world. Empathy [...] provides a viewpoint in which one's centre of orientation becomes one among others. Clearly, the space correlated to such a viewpoint cannot be one's own egocentric space, for that space is defined by one's own zero-point, whereas the new spatial perspective contains one's zero-point as simply one spatial point among many others." (Thompson, 2001, 19)

⁵⁶ "The relations that define a machine as a unity, and determine the dynamics of interactions and transformations which it may undergo as such a unity, constitute the organization of the machine." (Maturana & Varela, 1980, 77)

⁵⁷ “ [...] the organization of a machine is independent of the properties of its components which can be any, and a given machine can be realized in many different manners by many different kinds of components. In other words, although a given machine can be realized by many different structures, for it to constitute a concrete entity in a given space its actual components must be defined in that space, and have the properties which allow them to generate the relations which define it.” (Maturana & Varela, 1980, 77)

⁵⁸ The “glue” metaphor is a common one but it may need rethinking as it applies to an adhesive, immobile bonding agent. A joint, hinge or graphite type lubricant between surfaces may be a more appropriate metaphor.

⁵⁹ “The fundamental approach being advocated here is to understand and respect the natural form of the digital computer, to facilitate the process of evolution in generating forms that are adapted to the computational medium, and to let evolution find forms and processes that naturally exploit the possibilities inherent in the medium.” (Ray, 2001)

⁶⁰ http://www.groupc.net/work.php?section=software&work=microimage_s

⁶¹ A term from Felix Guattari that extends the concept of ecology to include many levels of human participation: “Without modifications to the social and material environment, there can be no change in mentalities. Here, we are in the presence of a circle that leads me to postulate the necessity of founding an “ecosophy” that would link environmental ecology to social ecology and to mental ecology.” (Guattari, 2000)

⁶² The open architecture of the application allows for Waag Society and user development of new modules. In the final 0.9 version of KeyWorx for artists, one hundred and five modules were supported.

⁶³ Keystroke is developed in the Medialab of the Society for Old and New Media by Niels Bogaards, Just van den Broecke, Sher Doruff, and Tom Demeyer - www.waag.org. KeyStroke has received support from Stichting STEIM, de Amsterdams Fonds voor de Kunst, de Mondriaan Stichting, Fonds voor de Podium Kunst, The ArtsAlliance, UK and MultiMediaLab2, UK.

⁶⁴ David Garcia, Barbara Pyle, Nanette Hoogslag and Sher Doruff.

⁶⁵ <http://www.steim.nl>

⁶⁶ KeyStroke received support from Stichting STEIM, het Amsterdams Fonds voor de Kunst, de Mondriaan Stichting, Fonds voor de Podium Kunst, The Arts Alliance, and MultiMediaLab2.

⁶⁷ Artists such as Michelle Teran, Jeff Mann, Motherboard, Ellen Roed and Isabelle Jenniches.

⁶⁸ For clarity, KeyStroke, the original application targeted to artists, was renamed KeyWorx in 2002 when a company designing keystroke recorders challenged our right to the name. Key-

Stroke, the artist application, became KeyWorx for a time. The protocol for the old Key-Stroke/KeyWorx will be phased out by the end of 2005, leaving the new open-source reference application to be renamed once again to KWart – inelegant but functional. KeyWorx is now the name of the extensible open-source platform from which a wide variety of clients can be built – by anyone.

⁶⁹ <http://www.waag.org>

⁷⁰ Ibid.

⁷¹ <http://www.keyworx.waag.org>

⁷² The full interviews are available at:

http://www.smartlabcentre.com/radical/good_practice/doruff.html

⁷³ Developed by by programmer Lodewick Loos.

⁷⁴ <http://kwx.dev.waag.org/docs/>

⁷⁵ The Patcher is reconceived in the open source application as the TCC – Traffic Control Center.

⁷⁶ Grosz: “The act of recognition is the point at which memory proper and action are at their closest point.” (2004, 171)

⁷⁷ “What philosophy tries to articulate are contingencies: potential relational modulations of contexts that are not yet constrained in their ordering as possibilities that have been recognized and can be practically regulated.” (Massumi, 2002a, 240)

⁷⁸ “Imagination is the mode of thought most precisely suited to the differentiating vagueness of the world. It alone manages to diagram without stilling. Imagination can also be called intuition: a thinking feeling. Not feeling something. Feeling thought – as such, in its movement, as a process, on arrival, as yet unthought out and unenacted, postinstrumental and preoperative.” (Massumi, 2002a, 134)

⁷⁹ Architectural theorist Greg Lynn is quoted: “The term ‘virtual’ has recently been so debased that it often simply refers to the digital space of computer-aided design. It is often used interchangeably with the term ‘simulation.’ Simulation, unlike virtuality, is not intended as a diagram for a future possible concrete assemblage but is instead a visual substitute.” (1999. *Animate Form*, Princeton, Princeton Architectural Press, 10 In: Borrodori, 2000)

⁸⁰ “The plane of immanence is the movement (the facet of movement) which is established between the parts of each system and between one system and another, which crosses them all, stirs them all up together and subjects them all to the condition which prevents them from being absolutely closed [...] It is a bloc of space-time [...] *The material universe, the plane of immanence, is the machine assemblage of movement-images.*” (Deleuze, 1986a, 61)

⁸¹ A non-Euclidean topological figure in continuous transformation would better describe the experience of durational space. "The Möbius strip and the Klein bottle are two-dimensional figures whose folding and twisting on themselves create three-dimensional effects. The "effects" are real, but not part of the formal definition of the figure." (Massumi, 2002, 185)

⁸² "The quasi-corporeal can be thought of as the sum total of the relative perspectives in which the body has been implicated, as object or subject, plus the passages between them: in other words, as an interlocking of overlaid perspectives that nevertheless remain distinct." (Massumi, 2002a, 57-8)

⁸³ "For Bergson, intuition defines the life of the spirit, which "posits and constitutes problems" (qui pose et constitue les problèmes) rather than analytically evaluating their formal configuration and truth-value. There are, Deleuze continues glossing Bergson, fewer false solutions than false problems. At the heart of a philosopher's beliefs there is always an intuition, and this is why intuition is the "method" used by Bergson to eliminate false problems." (Borrodori, 2001)

⁸⁴ "Intuition, then, is the way the inner directedness of instinct can rejoin the outer orientation of intellect, which have been elaborated by evolution in opposite directions." (Grosz, 2004, 241)

⁸⁵ "Deleuze's emphasis on the notion of force in Nietzsche is the result of his never-broken commitment to Bergson, the notion of difference in kind, and the tendential model. By positing the tendential model alongside causality Deleuze passes down to poststructuralism Bergson's reliance on two separate orders: the intensive and the extensive, the hermeneutic and the quantitative." (Borrodori, 2000, 483 - 484)

⁸⁶ "Filtering" is also Hansen's term to upgrade Bergson's "selecting" to the digital age (2004) Deleuze refers to it as *framing* in *Cinema 1* (1991, 64).

⁸⁷ Murphie on the skin as a Deleuze and Guattari surface: "The importance of the surface here cannot be overestimated. It is the surface, the skin, which gives the interactive potential for the universe [...] The skin makes possible the event, which connects various possibilities of movements that actualise becomings, and events. It is at the skin that cosmic forces interact, not in the depths." (2005)

⁸⁸ A compressed version of Deleuze's take on Bergson's methodological rules:
First Rule: Apply the test of true and false to problems themselves. Condemn false problems and reconcile the truth and creation at the level of problems. *Complementary Rule:* False problems are of two sorts, "non-existent problems," defined as problems whose very terms contain a confusion of the "more" and the "less"; and "badly stated" questions, so defined because their terms represent badly analysed composites. *Second Rule:* Struggle against illusion, re-discover the true differences in kind or articulations of the real. *Complementary rule to the*

second rule: The real is not only that which is cut out according to natural articulations or differences in kind; it is also that which intersects again along paths converging toward the same ideal or virtual point. *Third Rule*: State problems and solve them in terms of time rather than of space. (1998a, 14-31)

⁸⁹ Carl R. Hausman, in his paper "Bergson, Peirce and Reflective Intuition" claims that this philosophical method has an "intellectual sympathy": "But as intellectual, they are more complex than common sense intuitions. They must be distinguished from popular notions that intuitions are emotionally charged, immediate (unreasoned) insights or premonitions. If reflective, they seem to be more than immediate. As more than immediate, they must include distinct moments of some kind of internal distancing, a marking of a distinction a "stepping back" and an implicit awareness of what is occurring during an act of intuiting. Without this implicit awareness, I see no way they could apprehend the movement to which they must penetrate." (1999, 289-300)

⁹⁰ Cultural anthropologist Paul Rabinow, after Foucault, has articulated problematising, and by default differentiating, as event-based taxonomy: "The problematization of classifications, practices, things is an event. A sensibility of constant change, and a certain pleasure and obligation to grasp it and participate in the transformations, constitute one mode of relating to things." (2003, 67)

⁹¹ Transduction is "the process whereby a transducer accepts energy in one form and gives back related energy in a different form; "the transduction of acoustic waves into voltages by a microphone" From Hyperdictionary:
<http://www.hyperdictionary.com/search.aspx?define=transduction>

⁹² "We may be said to know-how by means of our habits [...] We walk and read aloud, we get off on street cars, we dress and undress and do a thousand useful acts without thinking of them. We know something, namely, how to do them....[If] we choose to call [this] knowledge [...] then other things also called knowledge, knowledge *of* and *about* things, knowledge *that* things are thus and so, knowledge that involved reflection and conscious appreciation, remains of a different sort." (Dewey, 1922, 177)

⁹³ "Libet asked people to move their wrist at a time of their choosing. The participants were asked to look at a moving dot that indicated the time, and note the precise time when they decided to flex their wrist. The participants reported having the intention about 200 milliseconds before they actually began to move. Libet also measured the "readiness potential" in the brain, which is revealed by activity recorded from the supplementary motor area of the brain (which is involved in controlling movements). This readiness potential occurred some 550 milliseconds before the action began. The brain events that produced the movement thus occurred about 350 milliseconds before the participant was aware of having made a decision. Libet shows that this disparity is not simply due to extra time required to note and report the time." (Kosslyn, 2004)

⁹⁴ "Reverse epiphenomenalism claims that there would be no 'matter' or real extension if there were no autopoietic 'primary true forms' or subjectivities as indivisible unities (without any externality and an inside beyond any internal world)". (Bains, 2002, In: Massumi, 2002b, 108-9)

⁹⁵ <http://www.solarviews.com/eng/rover.htm>

⁹⁶ See Ted Honderich's rebut "On Benjamin Libet: Is the Mind Ahead of the Brain? Behind It? and Is the Mind Ahead of the Brain? - Rejoinder to Benjamin Libet", on the *Determinism and Freedom* website, <http://www.ucl.ac.uk/~uctytho/libetnew.html>

⁹⁷ <http://framework.v2.nl/archive/archive/node/event/default.xslt/nodenr-148172>

⁹⁸ <http://www.ubermatic.org/interfacing/>

⁹⁹ Ibid

¹⁰⁰ Soules quotes Derek Bailey on the contingent nature of musical improvisation, and its subsequent resistance to analysis: "...[A]ny attempt to describe improvisation must be...a misrepresentation, for there is something central to the spirit of voluntary improvisation which is opposed to the aims and contradicts the idea of documentation." (Soules, 2001, 4)

¹⁰¹ "MMORPGs (Massively Multiplayer Online Role-Playing Games, pronounced "Ememmoh-Arpeegee") follow a client-server model in which players, running the client software, are represented in the game world by an avatar — a graphical representation of the character they play. Providers (usually the game's publisher), host the persistent worlds these players inhabit. This interaction between a virtual world, always available for play, and an ever-changing, world-wide stream of players characterizes the Massively Multiplayer Online Role-Playing Game. <http://en.wikipedia.org/wiki/MMORPG>

¹⁰² "Influential Parisian theorist and actor (1879-1949) and contemporary of Bergson. Copeau promoted "the *art* of improvisation and the illusion of spontaneity" (155) in his actors, and sought to define a "pre-established form which is inspirational" (158). Apart from repeating the idea that improvisation occurs within a matrix of constraints, Copeau draws our attention to the self-reflexive awareness required of performance." (Copeau, 1990. 5-6; In: Soules, 2001).

¹⁰³ Spolin's game theory for improvisation was extensively used in the early days of the Open Theater by Joseph Chaikin and by Peter Brook. Countless actors have studied this technique which remains lively in the work of Second City, in Chicago, run by the son of Spolin, Paul Sills.

¹⁰⁴ See Massumi's "The Political Economy of Belonging and the Logic of Reason" for an analysis of co-operative belonging together in the collective event space of a football game (2002a, 68-88)

¹⁰⁵ "Computer engineers chose to introduce randomness into computers in the form of pseudo-random number generators. As the name suggests, pseudo-random numbers are not truly random. Rather, they are computed from a mathematical formula or simply taken from a precalculated list. A lot of research has gone into pseudo-random number theory and modern algorithms for generating them are so good that the numbers look exactly like they were really random." For more on the production of true random sequences of numbers see <http://www.random.org/essay.html>

¹⁰⁶ Transvergence is a term conceived by artist/theorist Marcos Novak in contra-distinction to convergence and divergence. See his paper "Speciation, Transvergence, Allogenesis: Notes on the Production of the Alien" <http://www.mat.ucsb.edu/~marcos/transvergence.pdf>

¹⁰⁷ "A group improvisation is a complex social phenomenon. During a performance, there is a subtle, web-like interplay of individual psychological needs and intentions, technical tasks and difficulties associated with playing musical instruments, awareness of the audience (if the performance is public) and, most centrally, conscious and unconscious reactions to sound stimuli. Cognitive distributions in this context occur between musician and instrument, between or among two or more musicians, and between musicians and the music itself." (Burrows, 2004, 2)

¹⁰⁸ British guitarist Derek Bailey has suggested the term "non-idiomatic improvisation" as an alternative for "free improvisation."

¹⁰⁹ This remark is an homage to Paul Klee's famous dictum that: Art makes the invisible visible. (paraphrased)

¹¹⁰ "With the occurrence of two sounds whose timbre, structure, and dynamics are so different as to avoid the traditional concept of melody, these entities become events, that is, equal in importance but not necessarily building to a climax or part of a cadence. The introduction of silence is an integral part of a composition, to be treated as an equal with sound, becomes a help with identifying these events in time. The events become important in themselves, and contribute less to the phrase, period or movement of the work. As these sounds separate, consideration of the significance of their order becomes immediately suspect; that is, if each "event", each unit, is predominantly important in itself, the order of these units becomes less and less important." (Cope, 1976, 174)

¹¹¹ "John Cage and Roger Reynolds. "A Conversation," *Musical Quarterly*, 65, 1979, 581. In: Feisst, 2002

¹¹² <http://www.magpiemusicdance.com/main.htm>

¹¹³ *Jam session*: An informal gathering and performance of musicians, stressing improvisation. *Improvisation*: Spontaneous invention within the context of a given tune; creating a new melody while performing; spontaneous composition.

http://www.jazzinamerica.org/l_glossary.asp?StartLtr=I&EndLtr=R

¹¹⁴ <http://creativecommons.org/>

¹¹⁵ Brown and Bischoff describe the historical origins of the Hub: "This article documents the work of two bands that were active in the San Francisco Bay Area between the mid-1970s and late 1990s. The League of Automatic Music Composers and The Hub were two of the first ensembles to investigate the unique potentials of computer networks as a medium for musical composition and performance. Both groups came about as associations of computer music composers who were also designers and builders of their own hardware and software instruments." <http://crossfade.walkerart.org/brownbischoff/>

¹¹⁶ http://crossfade.walkerart.org/brownbischoff/hub_texts/simple_deg_f.html

¹¹⁷ Hub members Chris Brown and John Bischoff have assembled and edited a vast range of texts and audio samples from the band's career. This text is published at: http://crossfade.walkerart.org/brownbischoff/hub_texts/hub_aesthetics_f.html

¹¹⁸ http://crossfade.walkerart.org/brownbischoff/hub_texts/points_of_presence_f.html

¹¹⁹ <http://share.dj/share/credo.php>

¹²⁰ In a 2003 New York Times article, "Clash, Then Synthesis: Joys of a Laptop Jam", Joanna Jainchill has quoted a longtime KeyWorx artist, Daniel Vatsky (one of the artists featured in the Interfacing/Radiotopia/KeyWorx performance and a regular participant at [Share]): "I wasn't performing before I came here [...] It's a really unique place because even if you're just starting out you can come and play with live musicians. It's important you're not just putting on a track you already know. You're constantly being thrown a curveball." (The New York Times, Thursday, July 10, 2003)

¹²¹ <http://rhizome.org/netartnews/story.rhiz?×tamp=20021010>

¹²² Performance scholar Marvin Carlson acquiesces to the contested and convoluted hermeneutics of "performance" and "performativity." He cites a definition of performance from Richard Bauman's *International Encyclopedia of Communications* that best approximates a facile generalisation. According to Bauman: "[A]ll performance involves a consciousness of doubleness, through which the actual execution of an action is placed in mental comparison with a potential, an ideal, or a remembered original model of that action. Normally this comparison is made by an observer of the action [...] but the double consciousness, not the external observation, is what is most central [...] Performance is always performance for someone, some audience that recognizes and validates it as performance even when [...] that audience is the self." (1996, 5)

¹²³ <http://webjam.nsad.ac.uk/decentred/pages/interview.html>

¹²⁴ "[...] it differs from the cinematic on account of the means by which it operates this shift:

whereas the cinematic ASW [Any Space Whatever] emerges as a transfiguration of an empirical spatial experience, the digital ASW comprises a bodily response to a stimulus that is both literally unprecedented and radically heterogeneous to the form of embodied experience.” (Hansen, 2004, 205)

¹²⁵ Massumi neatly describes spatial orientation, a key experiential component of networked interaction in terms of a folding of Euclidean (positional) and non-Euclidean (movement) dimensions. On orienting abilities he says: “a synesthetic system of cross-referencing supplements a systemic duality, exoreferential and self-referential, positional and moving, Euclidian and self-varyingly monadic” (2002a, 182) and “The folding Euclidian and non-Euclidian into each other is itself understandable only in topological terms [...] Simply to put the two together you have to make a move between them. You have to fold experience back onto itself. You have to twist one of its dimensions into the other and cross-reference them both to the operation.” (184)

¹²⁶ From Kenneth Knoespel’s essay “Diagrams as Piloting Devices in the Philosophy of Gilles Deleuze”: “In a sense, diagramma embodies a practice of figuring, defiguring, refiguring, and prefiguring. What is interesting is that the diagram participates in a genealogy of figures that moves from the wax tablet to the computer screen. From a phenomenological vantage point, the Greek setting of diagram suggests that any figure that is drawn is accompanied by an expectancy that it will be redrawn [...] Here a diagram may be thought of as a relay. While a diagram may have been used visually to reinforce an idea one moment, the next it may provide a means of seeing something never seen before.” (2001, 147)

¹²⁷ Deleuze and Guattari were influenced by C.S. Peirce’s diagram: based on signifier-signified relations: “this leads him to make the “diagram” a special case of the icon (the icon of relation). Peirce is the true inventor of semiotics [...] indexes, icons, and symbols seem to us to be distinguished by territoriality-[deterritorialization](#) relations, not signifier-signified relations. Second, the diagram as a result seems to have a distinct role, irreducible to either the icon or the symbol.” (1987, 531).

¹²⁸ From Deleuze’s *Foucault*: “So the abstract formula of Panopticism is no longer ‘to see without being seen’ but *to impose a particular conduct on a particular human multilicity*. We need only insist that the multiplicity is reduced and confined to a tight space and that the imposition of a form of conduct is done by distributing in space, laying out and serializing in time, composing in space-time, and so on. The list is endless, but it is always concerned with unformed and unorganized matter and unformalized, unfinalized functions, the two variables being indissolubly linked [...] What can we call such a new informal dimension? On one occasion Foucault gives it its most precise name: it is a ‘diagram’, that is to say a ‘functioning, abstracted from any obstacle [...] or friction [and which] must be detached from any specific use.’ The diagram is no longer and auditory or visual archive but a map, a cartography that is coextensive with the whole social field.” (2000, 34)

¹²⁹ If knowledge [thought] consists of linking the visible and the articulable, power is its pre-

supposed cause but conversely, power implies knowledge as the bifurcation or differentiation of domains without which power would not become an act..." (Deleuze, 2000, 39).

¹³⁰ "[...] the immanent cause is realized, integrated and distinguished by its effect. In this way there is a correlation or mutual presupposition between cause and effect, between abstract machine and concrete assemblages..." (Deleuze, 2000, 37)

¹³¹ "Art is not chaos but a composition of chaos that yields the vision or sensation, so that it constitutes, as [James] Joyce says, a chaosmos, a composed chaos – neither foreseen nor pre-conceived." (Deleuze and Guattari, 1994, 204)

¹³² The KeyWorx interface enables eight independent layers of image rendering. These functional limits are arbitrary and based on machine speeds and the available real estate of the screen-based interface.

¹³³ "The plane of consistency knows nothing of differences in level, orders of magnitude, or distances. It knows nothing of the difference between the artificial and the natural. It knows nothing of the distinction between contents and expressions, or between forms and formed substances; these things exist only by means of and in relation to the strata." (Deleuze and Guattari, 1987, 69-70)

¹³⁴ Taking Massumi's cue: "A concept can be severed from the systems of connections from which it is drawn and plopped into a new and open environment where it suffers an exemplary kind of creative violence [...] A concept is by nature connectable to other concepts. A concept is defined less by semantic content than by the regularities of connection that have been established between it and other concepts: its rhythm of arrival and departure in the flow of thought and language; when and how it tends to relay another concept. When you uproot a concept from its network of systemic connections with other concepts you still have connectivity. You have a systemic connectability without the system." (2002, 20)

¹³⁵ Illustration from the Exploratorium Museum published at:
<http://www.exploratorium.edu/complexity/CompLexicon/catastrophe.html>

¹³⁶ Synaesthetic forms, in the context of new media "objects" might be analogue and tactile (objects modified by distributable digital protocols such as Midi and Open Sound Control (OSC)) or digitally screen-based. Screen-based biograms most often comply with certain synaesthetic conditions in which intersensory cross-referencing takes place in an intensive, virtual, non-Euclidean space between the artist and the monitor surface. This corresponds to Cytowic's *peri-personal* "limb-axis space, immediately surrounding the body" (1995) and to Ruyer's full frontal absolute survey.

¹³⁷ Massumi clarifies the shape of experience as "[...] a one-sided topological figure: an abstract (recessive/pop-out) "surface" for the reception, storage, and reaccess of qualitative hypereffectivity that can only be approached head-on." (2002a,186)

¹³⁸ Cytowic uses the term idiopathic and cites these conditions as necessary to synaesthesia: "Idiopathic synesthesia is defined by five clinical findings: It is (1) involuntary and automatic, (2) spatially extended, (3) consistent and generic, (4) memorable, and (5) affect-laden. These refer to specific characteristics of the synesthetic person's experience." (2001, 10)

¹³⁹ Physiological synaesthesia, "a simultaneous cerebral processing of all sensory modalities, leading to suitable behaviors closely adapted to environmental conditions" (Ternaux, 2003) is common to everyone in the experience of multimodal activity. Food intake is an example of quotidian multisensory activity. Sensory relations naturally assist in enacting with the environment and impact on evolutionary development. Vision, hearing, touch, smell, taste and proprioception all work in concert as conscious and unconscious sensation.

¹⁴⁰ People with fused sensory perceptions were thought to be relatively fractional in number, 0.0005% of the world population in 2001 (Harrison, 2001, 55). But statistics are variable and estimates problematic: "Estimates of the prevalence of synaesthesia vary dramatically. Cytowic (1989; 1997) estimates that it occurs in 1 in 20,000 people, while Galton (1880) placed the prevalence at 1 in 20. More recent, systematic, studies have estimated that synaesthesia occurs in 1 in 2,000 people (Baron-Cohen *et al.*, 1996). Our own results indicate that the prevalence may be even greater, perhaps as much as 1 in 200" (Ramachandran, Hubbard, 2001, 4). Cytowic himself claims that some types of synaesthesia are as common as 1 in 200 and that 75% of synaesthetes are women (2002).

¹⁴¹ Personal space is the space the body actually occupies. Extra-personal space is outside the reach of the limbs. Massumi describes peri-personal space as: "the liminal nonplace between the eyes and the objects in the world [...] the border of what we think of as internal, personal space and external, public space." (2002a, 187)

¹⁴² Recent Cross-Modal Transfer (CMT) and Neonatal Synaesthesia (NS) research suggests that there are degrees of modal fusion at birth, which is outgrown as the brain matures (Baron-Cohen, 1996; Cytowic, 2002).

¹⁴³ http://cytowic.net/Synaesthesia/Synesth_Encyclo_/synesth_encyclo_.HTM#Fig6ab
<http://publicaffairs.uth.tmc.edu/hleader/archive/GENERALHEALTH/041004/>

¹⁴⁴ This one-dimensional surface or survey (survol) first argued by philosopher Raymond Ruyer positions the biogram as always "*in front* of you [...] the synesthetic form of experience is *faced*" Massumi, 2002a, 188). Paul Bains describes Ruyer's survey: "Ruyer claims that visual sensation has only side, somewhat like a möbius surface though the analogy should remain one [...] This one-sidedness of visual sensation is due to the non-geometrical and non-dimensional character of survey. *If the sensible surface could be seen by both sides it would no longer be a sensation but an object.* The over-viewing I/eye is metaphorical. (2002, 109) Ruyer's theory of the *survey* (fly over, absolute oversight) is described by the translators of Deleuze and Guattari's *What Is Philosophy?*: "The immediate survey of the unity of the visual

field made up of many different details takes place within the dimension of the visual sensation itself; it is a kind of 'self-enjoyment' that does not involve any supplementary dimension." (1994, ix-x)

¹⁴⁵ The *pure Event* as described by Massumi: "that substanceless and durationless moment [...]. As time-form it belongs to the virtual, defined as that which is maximally abstract yet real, whose reality is that of potential - pure relationality, the interval of change, the in-itself of transformation. It is a time that does not pass, it only comes to pass. It cannot be suspended because unlike empirical time, it does not flow. The event is superempirical: it is the crystallization, out the far side of quasi-corporeality, of already actualized spatial perspectives and emplacements into a time-form from which the passing present is excluded and which, for that very reason, is as future as it is past, looping directly from one to the other. (2002a, 58)

¹⁴⁶ Massumi cites the testimony of a spatial-sequence synaesthete "MP". Though this example of a one-dimensional survey described by MP is highly specific to her synaesthesia, it presents an interesting correlation to digitally developed or quasi-synaesthetic experience in screen-based digital media processing environments. (Cytowic, 1995)

¹⁴⁷ "Complementary Rule: False problems are of two sorts, 'non-existent problems,' defined as problems whose very terms contain a confusion of the 'more' and the 'less'; and 'badly stated' questions, so defined because their terms represent badly analysed composites." (Deleuze, 1991, 17)

¹⁴⁸ <http://sistero.sysx.org/inc/newoldmedia.html>

¹⁴⁹ <http://creativecommons.org/>

¹⁵⁰ Intrusion made acceptable through ubiquitous spyware and key-logging merchandising such as: <http://www.spectorsoft.com/>

¹⁵¹ see threads on nettime and iDC (Institute for Distributed Creativity) for voluble threads on this topic such as "Who's Afraid of Web 2.0" and "Against Web 2.0" among many others. <http://mailman.thing.net/pipermail/idc/2006-May/thread.html>

Bibliography

- Agamben, Giorgio, 1993. *The Coming Community*, trans. Michael Hardt, Minneapolis, University of Minnesota Press
- Ansell Pearson, Keith, 1997. *Viroid Life*, London, Routledge
- Asada, Akira, 1998. "Time and Creation: An Interview with Ilya Prigogine," *Intercommunication*, No 23, Winter, 5-6
- Ausch, Robert, Randal Doane and Laura Peerz, "Interview with Elizabeth Grosz," *Found Object*, Vol 9, Published online:
http://web.gc.cuny.edu/csctw/found_object/text/grosz.htm
- Baecker, Dirk, 2001. "Why Systems?" *Theory, Culture & Society* Vol. 18, pp. 59-74
- Bains, Paul 2002. "Subjectless Subjectivities," In: *A Shock to Thought: Expression After Deleuze and Guattari*, ed. Brian Massumi, London, Routledge
- Barabási, Alberto-Lázlo, 2002. *Linked: The New Science of Networks*, Cambridge, Perseus Publishing
- Baron-Cohen, Simon, 1996. "Is There a Normal Phase of Synaesthesia in Development?" *PSYCHE* 2/27, Published online:
http://psyche.cs.monash.edu.au/v2/psyche-2-27-baron_cohen.html
- Bar-Yam, Yaneer, 1997, 2003. *Dynamics of Complex Systems*, Boulder/New York, Westview Press/Perseus Group Press
- Bateson, Gregory, 1972. *Steps to an Ecology of Mind*, New York, Ballantine
- Bergson, Henri, 1991. *Matter and Memory*, trans. N.M. Paul and W.S. Palmer, New York, Zone Books, Reissue edition, First published London, G. Allen, 1911
- Bergson Henri, 1992. *The Creative Mind*, New York, Citadel Press Group, First published New York, Philosophical Publishing, 1946, 1972
- Bergson, Henri, 2001. *Time and Free Will: An Essay on the Immediate Data of Consciousness*, New York, Dover First published London, G. Allen, 1913
- Bergson, Henri, 1911. *Creative Evolution*, trans. Arthur Mitchell, New York, Henry Holt and Company Published online:
http://spartan.ac.brocku.ca/~lward/Bergson/Bergson_1911a/Bergson_1911_toc.html
- Berliner, Paul, 1994. *Thinking in Jazz: The Infinite Art of Improvisation*. Chicago, University of Chicago Press
- Bertalanffy, Ludwig von, 1968. *General Systems Theory*. New York, George Braziller
- Borrodori, 1999, "The Metaphysics of Virtuality in Bergson and Nietzsche," paper presented at the Fellows Seminar, The Italian Academy for Advanced Studies, New York, Columbia University
- Borrodari, Giavanna, 2000. "Virtuality, Philosophy, Architecture," *Columbia Documents for Architecture and Theory*, Vol. 7, Spring

- Borrodari, Giavanna, 2001. "The Temporalization of Difference," *Continental Philosophy Review*, March, Springer Science+Business Media B.V., Formerly Kluwer Academic Publishers B.V. Issue: Volume 34: 1, 1-20
- Boyd, Neva L. "Play, a Unique Discipline," In: Spolin, Viola, 1999. *Improvisation for the Theater*, 3rd Edition, Evanston, IL, Northwestern University Press
- Buchanan, Mark, 2002. *Nexus: Small Worlds and the Groundbreaking Science of Networks*, New York, W.W. Norton & Co.
- Brown, Chris and John Bischoff, 1970-2002. "Hub Aesthetics," *Indigenous to the Net: Early Network Music Bands in the San Francisco Bay Area*, Crossfade/Walker Arts Center, Published online: <http://crossfade.walkerart.org/brownbischoff/>
- Burrows, Jared B., 2004. "Musical Archetypes and Collective Consciousness: Cognitive Distribution and Free Improvisation," *Critical Studies in Improvisation/Études critiques en improvisation*, Vol. 1, No 1
<http://repository.lib.uoguelph.ca/ojs/index.html>
- Butler, Judith, 1993. *Bodies That Matter: On the Discursive Limits of Sex*, London, Routledge
- Cage, John, 1961, *Silence*, Middletown, Connecticut, Wesleyan University Press
- Cage, John, 1969. *Notations*, New York, Something Else Press
- Cahill, Reginald T., 2003. "Process Physics," *Process Studies Supplement*, Issue 5
Published online: <http://xxx.lanl.gov/abs/physics/0306196>
- Campana, D, 1985. "Interview with Cage," *Form and Structure in the Music of John Cage*, Evanston, Northwestern University Press
- Carlson, Marvin, 1996. *Performance: A Critical Introduction*. London, Routledge
- Chernoff, John Miller, 1979. *African Rhythm and African Sensibility*, Chicago, The University of Chicago Press
- Cilliers, Paul, 1998. *Complexity & Postmodernism: Understanding Complex Systems*, London, Routledge
- Clark, Andy, 1997. *Being There: Putting Brain, Body and World together Again*, Cambridge, MIT Press
- Cope, David H., 1976. *New Directions in Music*, Second Edition, Wm. C. Brown
- Copeau, Jacques, 1990. *Copeau: Texts on Theatre*. ed. & trans. John Rudlin and Norman H. Paul, London. Routledge In: Soules, 2001)
- Corbet, David, 1999. "Katie Duck: An Interview," *Proximity*, Vol. 2, No 4, Published online: http://proximity.slightly.net/v_two/v2e4a2.htm
- Crary, Jonathan and Sanford Kwinter, 1992. *Incorporations*, New York, Zone Books
- Cytowic, Richard, 1995. "Synesthesia: Phenomenology and Neuropsychology," *PSYCHE*, 2, (10) <http://psyche.cs.monash.edu.au/v2/psyche-2-10-cytowic.html>
- Cytowic, Richard, 2002. "Touching Tastes, Seeing Smells – and Shaking Up Brain Science," *Cerebrum: The Dana Forum on Brain Science*, Vol. 4, No 3, Summer

- Delanda, Manuel, 1998. "Deleuze and the Open-ended Becoming of the World", a lecture at the Conference: "Chaos/ Control: Complexity", ZiF Bielefeld June 27
- Delanda, Manual, 2002. *Intensive Science & Virtual Philosophy*, London, Continuum
- Deleuze, Gilles, 1986a. *Cinema 1: The Movement-Image*, trans. Hugh Tomlinson, Barbara Habberjam, London, Athlone Press. First French edition published in 1983. Reprint Continuum 2005
- Deleuze, Gilles, 1986b. *Cinema 2: The Time-Image*, trans. Hugh Tomlinson, Robert Galeta, London, Athlone Press. First French edition published in 1985. Reprint Continuum 2005
- Deleuze, Gilles and Claire Parnet, 1987. *Dialogues*, trans. Hugh Tomlinson, Barbara Habberjam, New York, Columbia University Press
- Deleuze, Gilles, 1990. *The Logic of Sense*, trans. Mark Lester, London, Athlone press. First French edition published in 1969. Reprint Continuum 2004
- Deleuze, Gilles, 1991. *Bergsonism*, trans. Hugh Tomlinson, Barbara Habberjam, New York, Zone Books. First French edition published in 1966
- Deleuze, Gilles, 1994. *Difference and Repetition*, trans. Paul Patton, London, Athlone Press. First French edition published in 1968. Reprint Continuum, 2004
- Deleuze, Gilles, 2000. *Foucault*, trans. Seán Hand, Minneapolis, University of Minnesota Press. First French edition published in 1986
- Deleuze, Gilles, 2003. *Francis Bacon: The Logic of Sensation*, trans. Daniel W. Smith, Minneapolis, University of Minnesota Press. First French edition published in 1981
- Deleuze, Gilles, 2004. "Bergson's Conception of Difference," in: *Desert Islands and Other Texts; 1953-1974*, New York, Semiotext(e)
- Deleuze, Gilles and Felix Guattari, 1987. *A Thousand Plateaus*, trans. Brian Massumi, London, The University of Minnesota Press
- Deleuze, Gilles and Felix Guattari, 1994. *What Is Philosophy?*, trans. Graham Burchell and Hugh Tomlinson, London, Verso Press
- Dewey, John, 1922. *Human Nature and Conduct: An Introduction to Social Psychology*, London, G. Allen & Unwin
- Dodson, C. T. J. and Parker, P. E., 1997. *A User's Guide to Algebraic Topology*, Dordrecht, Netherlands, Kluwer
- Dourish, Paul, 2001. *Where the Action Is*, MIT Press
- Doruff, Sher, 1999. "The KeyStroke Project," *Performance Research*, "Online" eds., Rick Allsop and Scott Delahunta, Vol. 4. No 2. Summer, Routledge
- Doruff, Sher, 2005a. "Collaborative Praxis: The Making of the KeyWorx Platform" In: *aRt&D: Research and Development in the Arts*, eds., Joke Brouwer, Arjen Mulder, Anne Nigten, Rotterdam, V_2 Nai Publishers
- Doruff, Sher, 2005b. "The KeyWorx Interviews: Transcripts of Interviews and Conversations with KeyWorx Artists," Published online: <http://spresearch.waag.org>

Doruff, Sher, 2005c. "KeyWorx: A Working-Alone-Together Reflection: Collaborative practice on a collaborative product," In: *A Guide to Good Practice in Collaborative Working Methods and New Media Tools Creation*, eds. Lizbeth Goodman and Katherine Milton, London, Office for Humanities Publications Published online: <http://www.ahds.ac.uk/creating/guides/new-media-tools/>

Duck, Katie. "Interview", *Tangent Magazine*, Published online: <http://www.katieduck.piartists.com/interviews/tangent.htm>

Eagleman, David. M. and Alex O. Holcombe, 2002. "Causality and the Perception of Time", *TRENDS in Cognitive Sciences*, Vol. 6 No. 8, August

Ednie-Brown, Pia, 2000. "The Texture of Diagrams," *Daidalos; Diagrammania*, issue 74, January

Everett, Tom, 1971. "Questions and Answers," *Composer 2*, No 4, 82

Feisst, Sabine, 2002. "Losing Control: Indeterminacy and Improvisation in Music since 1950", New Music Box:Web Magazine from the American Music Center Published online: <http://www.newmusicbox.org/article.nmbx?id=1653>

Feldman, Morton, 1969. "Between Categories," *The Composer 1*, No. 2, September

Foucault, Michel, 1977. *Discipline and Punish. Birth of the Prison*, trans. A. Sheridan, London, Pantheon

Gallagher, S. & A. Meltzoff, 1996. "The earliest sense of self and others: Merleau-Ponty and recent developmental studies," *Philosophical Psychology*, pp. 211-33

Gallagher, Shaun and Francesco Varela, 2001. "Redrawing the Map and Resetting Time," In: Steven Crowell, Lester Embree, Samuel J. Julian, eds, *The Reach of Reflection: Issues for Phenomenology's Second Century*, Center for Advanced Research in Phenomenology Inc.

Galloway, Alexander, 2003. *Protocol: How Control Exists After Decentralization*, Cambridge, MIT Press

Galloway, Alexander and Eugene Thacker, 2004. "The Limits of Networking," *net-time*, 15 March Published online: <http://www.nettime.org/Lists-Archives/nettime-l-0403/msg00090.html>

Gardner, M., 1984. "Klein Bottles and Other Surfaces," In: *The Sixth Book of Mathematical Games from Scientific American*. Chicago, University of Chicago Press, pp. 9-18

Gell-Mann, Murray, 1995. "What is Complexity?" In: *Complexity*, Vol. 1, No.1, John Wiley and Sons

Genosko, Gary, 2002. *Felix Guattari: An Aberrant Introduction*, London, Continuum

Gibson, James J., 1979. *The Ecological Approach to Visual Perception*, New York, Houghton-Mifflin,

Goffman, Erving, 1959. *The Presentation of the Self in Everyday Life*, New York, Doubleday

- Grosz, Elizabeth, 1999. "Thinking the new: of futures yet unthought," *Becomings: Explorations in Time, Memory and Futures*, Ithaca, NY & London, Cornell University Press
- Grosz, Elizabeth, 2004. *The Nick of Time: Politics, Evolution and the Untimely*, Durham and London, Duke University Press
- Guattari, Felix, 1995. *Chaosmosis: an ethico-aesthetic paradigm*, trans. Paul Bains and Julian Pefanis, Bloomington, Indiana University Press
- Guattari, Felix, 2000. *The Three Ecologies*. trans. Ian Pindar & Paul Sutton, London, The Athlone Press
- Haggard, Patrick, Clark, Sam and Kalogeras, Jeri, 2002. "Voluntary action and conscious awareness," Institute of Cognitive Neuroscience, University College London, Published online: *Nature Neuroscience* 18, March 2002, DOI: 10.1038/nn827
<http://www.nature.com/neuro/journal/v5/n4/full/nn827.html>
- Hall, Edward, 1992. "Improvisation as an Acquired, Multilevel Process," *Ethnomusicology*, Vol. 36, No. 2, pp. 223-235
- Hansen, Mark B.N., 2001. "Internal Resonance, or Three Steps Towards a Non-Viral Becoming," *Culture Machine: The Journal*, Issue 3 Published online:
<http://culturemachine.tees.ac.uk/Cmach/Backissues/j003/Articles/hansen.htm>
- Hansen, Mark B.N. 2004. *New Philosophy for New Media*, Cambridge, MIT Press
- Harrison, John, 2001. *Synaesthesia: The Strangest Thing*, Oxford, Oxford University Press
- Hausmann, Carl R., 1999. "Bergson, Peirce and Reflective Intuition," *Process Studies*, Vol. 28: 3-4, Fall-Winter
- Hayles, N. Katherine, 1999. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*, Chicago, University of Chicago Press
- Hayles, N. Katherine, 2004. "Narrating Bits: Encounters between Humans and Intelligent Machines," Published online:
http://vectors.aml.annenberg.edu/narrating_bits/
- Heims, Steve J., 1993. "Constructing a Social Science for Postwar America: The Cybernetics Group 1946-1953," Cambridge, MIT Press
- Henle, M., 1994. *A Combinatorial Introduction to Topology*. New York, Dover, p. 110
- Holmes, Nicholas P. and Charles Spence, 2004. "The body schema and multisensory representation(s) of peripersonal space," *Cogn Process*, 2004 June; 5(2): 94-105.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=16467906&dopt=Abstract
- Huizinga, Johan, 1938. *Homo Ludens: A Study of the Play Element in Culture*, New York, Roy Publishers
- Johnson, Steven, 2001. *Emergence: The Connected Lives of Ants, Brains, Cities and Software*, New York, Scribner
- Knoespel, Kenneth J., 2001. "Diagrams as Piloting Devices in the Philosophy of Gilles Deleuze," In: *Théorie - Littérature - Enseignement: Deleuze-Chantier*, Centre

de Recherches sur la Litterature et la Cognition, Presses Universitaires de Vincennes, Automne

Kosslyn, Stephen M., 2004. *Perspectives in Cognitive Neuroscience*, Cambridge, Harvard University Press

Latour, Bruno 1999. *Pandora's Hope: Essays on the Reality of Science Studies*, Cambridge, Harvard University Press

Lewis, George, 2004. "Gittin to Know Y'all: Improvised Music, Interculturalism and the Racial Imagination," *Critical Studies in Improvisation/Études critiques en improvisation*, Vol. 1, No. 1 Published online:
<http://repository.lib.uoguelph.ca/ojs/index.html>

Libet, Benjamin et al, 1979. "Subjective Referral of the Timing for a Conscious Sensory Experience," *Brain* 102, pp. 193-224.

Libet, Benjamin et al, 1983. "Time of conscious intention to act in relation to onset of cerebral activity (readiness potential): the unconscious initiation of a freely voluntary act," *Brain* 106, pp. 623-642

Libet, Benjamin, 2004. "The Temporal Factor in Consciousness," In: *Perspectives in Cognitive Science*, Stephen M. Kosslyn series ed.; *Mind Time*, Cambridge, Harvard University Press

Luhmann, Niklas, 1989. "Tautology and Paradox," *Essays on Self-Reference*, New York, Columbia University Press

Luhmann, Niklas, 1990. "The Cognitive Program of Constructivism and a Reality That Remains Unknown," In: *Selforganization: Portrait of a Scientific Revolution*, ed. Wolfgang Krohn et al., Dordrecht: Kluwer

Luhmann, Niklas, 1994. "Speaking and Silence," *New German Critique*, Winter94 Issue 61

Luhmann, Niklas, 1997. *Social Systems*, Stanford, Stanford University Press

Luhmann, Niklas, 2000. *Art as A Social System*, Stanford, Stanford University Press

Mackenzie, Adrian. 2002. *Transductions: bodies and machines at speed*, London, Continuum

Mackenzie, Adrian, 2003. "Transduction: invention, innovation and collective life" <http://www.lancs.ac.uk/staff/mackenza/papers.php>

Manovich, Lev, 2000. *The Language of New Media*, Cambridge, MIT Press

Massumi, Brian, 1992. *A User's Guide to Capitalism and Schizophrenia: Deviations from Deleuze and Guattari*, Cambridge, MIT Press

Massumi, Brian, 1998. "Involuntary Afterword" In: "Deleuze and Guattari and the Philosophy of Expression," *The Canadian Review of Comparative Literature/Revue Canadienne de Littérature Comparée*, Vol. 24, No. 3

Massumi, Brian, 2002a. *Parables for the Virtual: Movement, Affect, Sensation*, Durham, Duke University Press

Massumi, Brian, 2002b. "Introduction: Like a Thought" In: *A Shock to Thought*, Brian Massumi ed, London, Routledge

- Maturana, Humberto, 1978a. "Cognition", In: *Wahrnehmung und Kommunikation*, eds. Hejl, Peter M., Wolfram K. Köck, and Gerhard Roth, Frankfurt, Peter Lang, pp. 29-49 <http://www.enolagaia.com/M78bCog.html#The%20observer>.
- Maturana, Humberto, 1978b. "Biology of language: The epistemology of reality," In: *Psychology and Biology of Language and Thought: Essays in Honor of Eric Lenneberg*, eds. G. Miller and E. Lenneberg New York: Academic Press, pp. 27-64
- Maturana, Humberto, and Francisco Varela, 1980. *Autopoiesis and Cognition: The Realization of the Living*, eds. Robert S. Cohen and Marx W. Wartofsky, Boston Studies in the Philosophy of Science, Vol. 42, Dordrecht: D. Reidel Publishing Co.
- Maturana, Humberto, 1988. "Ontology of observing: The biological foundations of self consciousness and the physical domain of existence," In: *Texts in Cybernetic Theory: An In-Depth Exploration of the Thought of Humberto Maturana, William T. Powers, and Ernst von Glasersfeld*, ed. R. Donaldson, Felton CA, American Society for Cybernetics
- Miller, David P., 2003. "The Shapes of Indeterminacy: John Cage's *Variations I* and *Variations II*," *Frankfurter Zeitschrift für Musikwissenschaft*, Jg. 6, S. pp. 18-45
- Murphie, Andrew, 2005. "Vibrations in the Air: Performance and Interactive Techniques," *Performance Paradigm*, March. Published online: <http://www.performanceparadigm.net/>
- Murray, Joy, 1994. "Maturana's Biology and Some Possible Implications for Education," In: *Seized by Agreement, Swamped by Understanding*, eds. Lloyd Fell, David Russell, Alan Stewart, Sydney, Hawksbury Printing
- Nancy, Jean Luc, 2000. *Being Singular Plural*, Stanford, Stanford University Press
- Nattiez, Jean Jacques, ed, 1993. *The Boulez-Cage Correspondence*, Cambridge, University Press
- Novak, Marcos, 2002. "Speciation, Transvergence, Allogeneses: Notes on the Production of the Alien," *Architectural Design* 72/3 <http://www.mat.ucsb.edu/~marcos/transvergence.pdf>
- Obhi, S.S. and Haggard, P., 2004. "Free Will and Free Won't," *American Scientist*, Vol. 92, No. 4
- Oliveros, Pauline, 1999. "Quantum Improvisation: The Cybernetic Presence", Key-note address presented at the "Improvisation Across Borders" conference at University of California, San Diego, <http://www.deeplisting.org/pauline/writings/quantum.html>
- Prigogine, Ilya and Stengers, Isabelle, 1984. *Order Out of Chaos*. New York, Bantam Books
- Prigogine, Ilya, 1997. *The End of Certainty: Time, Chaos and the New Laws of Nature*, New York, The Free Press
- Protevi, John, 2005. "Deleuze and Guattari and Emergence," Available online: <http://www.artsci.lsu.edu/fai/Faculty/Professors/Protevi/Emergence.pdf>
- Rabinow, Paul, 2003. *The Essential Foucault*, (with Nikolas Rose), New York, The New Press

Ramachandran, V.S and E.M. Hubbard, 2001. "Synaesthesia – A Window into perception, Thought and Language," *Journal of Consciousness Studies* 8, No. 12, pp. 3-34

Ray, T. S. 2001. "Overview of Tierra at ATR", In: *Technical Information, No.15, Technologies for Software Evolutionary Systems*. ATR-HIP. Kyoto, Japan

Reed, David, 2001. "Reed's Law – An Interview," *Journal of Hyperlinked Organization*, January 19. Published online: <http://www.hyperorg.com/backissues/joho-jan19-01.html#reed>

Rheingold, Howard, 2002. *Smart Mobs*, Cambridge MA, Perseus Press

Schneider , Florian and Geert Lovink, 2004. "Notes on the State of Networking," *net-time*, 29 February Published online:
<http://www.nettime.org/Lists-Archives/nettime-l-0402/msg00099.html>

Schwartz, Hillel, 1992. "Torque: the new Kinesthetic of the Twentieth Century", In: *Incorporations*, eds. Jonathon Crary, and Sanford Kwinter, New York, Zone Books

Simondon, Gilbert. 1992. "The Genesis of the Individual," In: *Incorporations*, eds., Jonathon Crary and Sanford Kwinter; trans. M. Cohen and S. Kwinter, pp. 296-319

Soules, Marshall, 2001. "Improvising Character: Jazz, the Actor and Protocols of Improvisation," In: *The Other Side of Nowhere: Jazz, Improvisation, and Communities*, eds. Daniel Fischlin and Ajay Heble, Wesleyan University Press, 2004

Spolin, Viola, 1999. *Improvisation for the Theater*, 3rd Edition, Evanston, IL, Northwestern University Press

Swartz, Norman, 2001. *Beyond Experience: Metaphysical Theories and Philosophical Constraints*, Second edition published online:
http://www.sfu.ca/philosophy/beyond_experience/#dl

Szendrei, Eric V., 1989. "Bergson, Prigogine and the Rediscovery of Time," *Process Studies*, Vol.18, No. 3, Fall, pp. 181-193

Ternaux, Jean-Pierre. 2003. "Synesthesia: A Multimodal Combination of Senses", *Leonardo*, Vol. 36, No. 4, pp. 321-322

Tompkins, Calvin, 1965. *The Bride and the Bachelors*, New York, Viking Press

Thompson, Evan ed, 2001. "Empathy and Consciousness", In: *Between Ourselves: Second Person Issues in the Study of Consciousness*, Imprint Academic

Turner, Victor, 1982. *From Ritual to Theater: The Human Seriousness of Play*, New York, Performing Arts Journal

Turner, Victor, 1983. "Body, Brain and Culture" *Zygon* 18, 3 September, pp. 221-46

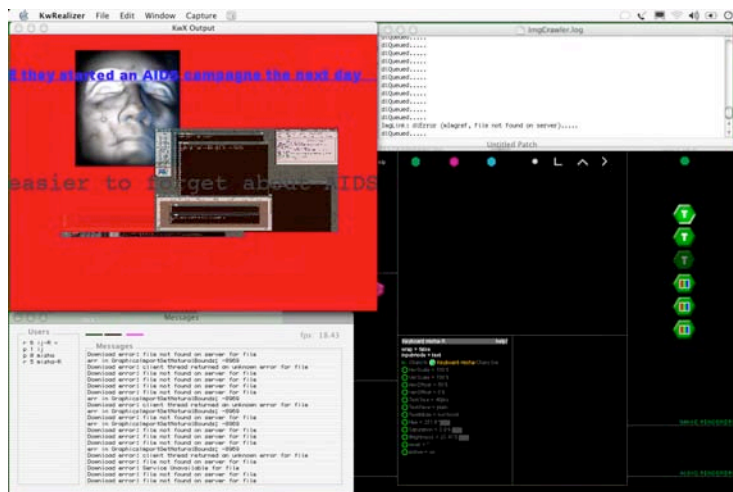
Turner, Victor, 1986. *The Anthropology of Performance*. New York, Performing Arts Journals

Van den Broecke, Just, 2006. "KeyWorx Whitepaper," Available online:
<http://kwx.dev.waag.org/docs/>

Varela, Francisco, 1979. *Principles of Biological Autonomy*, Elsevier

- Varela, Francisco, 1992a. "The Reenchantment of the Concrete," In: *Incorporations*, eds. Jonathon Crary, and Sanford Kwinter, New York, Zone Books, pp. 320-39
- Varela, Francisco, 1992b. *Ethical Know-How: Action, Wisdom and Cognition*, Stanford, Stanford University Press
- Varela, Francisco, 1993. *The Embodied Mind: Cognitive Science and Human Experience*, MIT Press
- Varela, Francisco, 1995. "The Emergent Self," In: Chapter 12, Brockman, John, *The Third Culture: Beyond the Scientific Revolution*, Simon and Schuster
- Varela, Francisco J., 1997. "The Specious Present: A Neurophenomenology of Time Consciousness", In: *Naturalizing Phenomenology: Issues in Contemporary Phenomenology and Cognitive Science*, ed. J. Petitot, F. J. Varela, J.M. Roy, and B. Pachoud, Stanford, Stanford University Press
- Waldrup, M. Mitchell, 1992. *Complexity*, New York, Touchstone
- Wolfe, Cary, 1998. *Critical Environments: Postmodern Theory and the Pragmatics of the Outside*, Theory Out of Bounds, Vol. 13, University of Minnesota Press
- Wolfram, Stephen, 2002. *A New Kind of Science*, Wolfram Media Inc.
- Wolfram, Stephen, 2006. *Mathworld: the Web's most extensive mathematics resource*, <http://mathworld.wolfram.com/>
- Zahavi, Dan, 2001. "Beyond Empathy" in *Between Ourselves: Second person issues in the study of Consciousness*, UK, Imprint Academic

Appendices



KeyWorx Screenshot: Michelle Teran

Excerpt from The KeyWorx Interviews

Selected comments from the interviews with
Michelle Teran, Isabelle Jenniches, Arjen Keesmaat and Lodewijk Loos
Interviewed and edited by Sher Doruff

Complete interviews available at: <http://spresearch.waag.org>

Introduction

The following interviews were conducted over a six-month period in 2004. A basic template of questions covering ten areas of interest was used. The interviews were conducted informally, giving the interviewees the opportunity to tangentially describe their experiences. The interview process did not adhere to an ethnographic methodological approach as the interviewer (SD) knows the interviewees well and has followed and/or participated in their working processes with KeyWorx for a number of years. The interest of the researcher in this case was to ask both mundane questions concerning quotidian practice and interface design as well as more esoteric questions concerning creative processes and what was then termed “intersubjective” experience. This phenomenological approach and terminology gradually transformed as the framing of the dissertation shifted. Terminology adopted in the dissertation such as *intuition*, *transduction*, *transversal*, *composition*, *indeterminacy* and *diagrammatic*, reflect conceptual vectors that emerged from these dialogical sessions. The interviews provide an entrance to the working methods and experiences of the artists and are an enlightening trace of the shifting interest of the research. The extracts presented here best correspond to the tenor of the thesis.

The following questionnaire was used as a template to ease comparative analysis of the interviews but was not strictly adhered to. The template changed after the first two interviews and more questions related to improvisational processes were added. I have chosen some relevant remarks by artists who participated in the *Interfacing Realities* performance at DEAF03. Additional remarks related to improvisation can be found on pages 132-141 of the dissertation.

The interviews were recorded to digital video. Each interview lasted approximately ninety minutes. The tapes were later transcribed yielding over 73,000 words of text. The conversational extracts are edited for clarity. For example some conversational jargon, “uhmm’s”, “ah’s”, “like’s”, “you know’s”, “sort of’s”, “I means”, etc., have been deleted as well as confusing conversational stops and starts. Michelle Teran, Nancy Mauro-Flude and Josephine Dorado are native English speakers. Lodewijk Loos and Arjen Keesmaat are native Dutch speakers and Isabelle Jenniches is a native German speaker. The interviews were conducted in English and transcribed by a native Dutch speaker. The researcher has taken some liberty in editing syntax, in order to provide a more readable document. Additionally, the questions and some of the comments in the excerpts presented here have been edited for further readability. The flavour of the remarks has not been altered in any way.

Original Interview Template – KeyWorx Questionnaire

User Experience

Expectations

1. Do you plan to meet via email, chat, phone?
2. Do you plan a structured approach before entering?
3. What is the degree of improvisation that is determined by you? That is co-determined?
4. What media or elements do you bring to a session? Are they shared beforehand or transferred during a session?
5. Do you agree on a communication strategy? IRC chat, iChat, chat in KWX
6. What do you to achieve in a collaborative session?
7. Are you excited by the prospect of unpredictability?
8. Are you interested in accomplishing a performative goal?

Entering a session – Procedural

9. How do you enter a session?
10. How does it feel when you first connect with the other participants?
11. Do you initially greet each other conversationally? Or, do you begin playing?
12. Do you incorporate your chat communication into the “performance?”

Decision-making – Media

13. How do you decide which media you want to use in a session?
14. How do decide which filters or modification to media you will use?
15. How do you think about input and output parameters of objects?
16. Do you generally work with the media you instantiate or are you more likely to modify the media of the others?
17. At what point do you feel the media is shared or collective? When it ceases to be your media file or their media file?
18. Do you gravitate towards text displays, pre-rendered media, or live media?

Decision-making – cooperation

19. Do you take control of the other players input devices (Mouse, joystick, game controller, keyboard)? If so, why and when?
20. How are you influenced by the choices of the others?
21. In general, are you more responsive or provocative?
22. How do you reach a synergetic dynamic? How long does it take on average to build to that dynamic?

Decision-making – creativity

- 23. Can you describe your perception of the creative experience in this platform?
- 24. Does “inspiration “ in an ephemeral, processual, collaborative presentation feel similar or different to other experiences in non-collaborative events?
- 25. Are your ideas and/or choices carefully considered, in general, or spontaneously applied?

Environmental affordances – Virtual

- 26. Do you feel the patcher, when occupied by other players, to be a field or environment?
- 27. Does it ever become immersive in the sense that the external environment fades from consciousness? If so, when does that happen?
- 28. Does the level of abstraction of the media objects present learning curves or learning ease?
- 29. Decision-making

Environmental affordances – Physical

- 30. What role does the physical, surrounding environment play on the embedded patcher environment?
- 31. Are ambient qualities a factor in your perception of the KWX properties?
- 32. Do you utilize external objects or factors as live data? If so how?
- 33. How is the surrounding environment of the other players a factor?
- 34. How does the bandwidth affect your communication with the others?

Interpretation of Meaning

- 35. How do you interpret the media (images, sound, text) as you are processing it?
- 36. Do you have a priori intentions to distribute a meaningful image? Montage?
- 37. Is meaning constructed on the fly? Is it momentary or are themes built up/
- 38. What role does randomness play? Indeterminacy?
- 39. If meaning is randomly constructed how is it interpreted?
- 40. Is there a point when the composite collage is collective in its interpretation?
- 41. How do you deal with the others modifying your intention or meaning?
- 42. Is there a dramaturgical element to your performance?
- 43. Is there a narrative element?

Intersubjective experience

- 44. How do you distinguish your input or intention from the others? Is it necessary to do that?

45. Do you ever reach a zone of interaction where you lose self-consciousness and become part of a collective process?
46. What role does the response of the others to your input play in your performance?
47. Do you recognize your intentions through the actions of the other players?
48. Are you conscious of playing particular role during a session – collaborator, performer, antagonist, etc?
49. Of shifting micro-identities?
50. How sensitive are you to the judgment of the others?
51. How cooperative are you when a new direction emerges?
52. Can you describe a feeling of “going with” as distinguished from “going against”?
53. Does reputation play a significant role in your selection of collaborators?
54. How do you feel about your reputation as a collaborator?
55. What role does trust play in working together?
56. What responsibility do you take for your actions and interactions?
57. Do you feel that a collective aesthetic emerges?
58. When you are making something, do you feel as though the concept is coming from you or that you are tapping into the concept?

Improvisation

59. What is your approach to improvisation? Do you work with preliminary rule-sets or constraints?
60. Do you feel you enter or exit the space when you contribute something?
61. How do you anticipate the choices/actions of the other plays? Is there any sense that replaces proprioception?
62. Do you feel a similar sense of time/timing in connected space as in physical space?
63. How do you adjust to virtual timing, latency, etc?
64. How do you detect nuance in the actions of your partners?
65. How do you signal intention?
66. Is the performance primarily a communication to an audience or is it an interpersonal experience?
67. Does the realization of an observing public alter the dynamics of the exchange between the actors?



MICHELLE TERAN (CA)

Michelle Teran lives and works in Amsterdam, Berlin and Toronto. As a media artist, she examines technological networks and how they are overlaid within social networks and everyday (social) spaces. She creates performances, installations and online works that are concerned with issues of communication, surveillance, psychogeography, presence, intimacy, social ritual, collaboration and public participation. She has talked, performed, exhibited at events and venues throughout North America, Europe and Japan such as Transmediale05, ISEA(02), BEAP(04), DEAF (00/02/04), Impakt (03), Argos Festival, Vooruit, Images Film and Video Festival, Transmediale Salon, Performance Space, PICA, Banff Centre for the Arts and also on the World Wide Web.

She was recently nominated for the Transmediale05 award and received Prix Ars Electronica honorary mention within the interactive art category for her ongoing performance 'Life: a user's manual', a work developed in 2003 during an artist-in-residence at Waag Society. In 2004, with Jeff Mann, she completed commission within Waag Society's Connected! Programme, for LiveForm :Telekinetics, a collaborative project develops experimental connected social spaces using streamed media, sensor-based and kinetic objects. Liveform:Telekinetics received the second place award from the Vida 8.0 Art & Artificial Life International Competition.

[...] it's that moment of connection that is always quite intriguing for me. [...] I've always worked, from the beginning, with live media because it's more uncontrollable and you just don't know where you're going to go. So if you use a text and a live video environment, it can become quite an intimate moment to see what you're creating together. And each person has a different value system around them, about what media they chose. For me, it just seemed like the way to go. And I'm still working that way.

[10]. Is there any physical feel of connection? Or relation? For some people when that connection is made it's still something fresh and new...

It's pretty much of a thrill when you first connect in general. So, I can't relive that experience. Like the first time I ever went on ICQ or knew what ICQ was and then realized that this was possible. Or being able to send video and be part of something, a multi-situated connection. Those types of things are amazing. But then it starts to become part of your

everyday experience; not that you do it everyday but it's just another layer. It's just another layer of who you are, and I have gone through moments when what I feel like is "this has been dramatic" - really extraordinary experiences that you could not have done if you were just, well, I was telling Niels, these spontaneous communitas as Victor Turner coins it. So you have that happen in physical reality. And then you have that happen on-line and you don't know when it hits you and it's hard to translate it. So, you might be going through this perfectly amazing experience and, maybe nobody else really knows or can pick up on that. It's really hard to predict or to translate.

17. So is there a particular point that you reach when you feel the media is shared or collective? When does it cease to be your media or your media file and when is it collective?

Oh, the minute you bring it in.

There's no sense of priority towards your own ...?

Well, there's always that sense of "oh, I'm sorry I just changed your keyboard task" excuse me. This politeness, but that's just tentative. It really depends on whom you're working with. I think it's quite okay to jump in on everybody's media. Live inputs, I think keyboards more than anything, are proprietary. Or there seems to be more "oh, I'm sorry I changed it to Ariel, I hope you don't mind", you know,

So if they are proprietary, doesn't it make it more provocative?

Yes, but usually on a few occasions it's being acknowledged, like: "oh, I'm sorry, I moved your...."

[23]. What I'm trying to get at is how it feels to you, the experience of making, creating something?

Sometimes it's thrilling, sometimes it's boring, you know, sometimes it's methodical, intimate, exciting, personal.

Do you ever feel you can achieve, for example, a thrill? Is it collective with the other people in the session? Can you reach it alone, where the other person isn't even contributing very much? Is that possible?

Yes, but that sort of brings up the question of how do you evaluate that? Because you know, it's what you take out of the experience. Online communication is fraught with miscommunication. And misinterpreted signs and gestures. I mean there aren't enough levels to tap into. Like body language or mere presence of the physical body. So then maybe it's just a mirror where you think you're in this intense connective moment but maybe you're

just connecting with yourself. Which is also another question of what you're deriving out of it, so..., I guess that it's well, no, it's hard to say.

24. Maybe this question gets closer to it. Does inspiration in an ephemeral, processual collaborative presentation - does that feel similar or different to other experiences in non-collaborative events?

Well I would say that it's different. It's a different experience because it's all coming together in one canvas. Yeah, it's everybody working on the same thing.

I could phrase it in a different way and say: the "aha moment", does it feel different when you're in KeyWorx than when you're in a Walk?

Yes. Cause you get into this rhythm, right? Yes, you get into this moment where there's a rhythm going on, where you say: "oh, this is becoming something good." So it's like a moulding process and it takes you someplace and then you're there. But just the experience that you can see what's going on and that you're part of... everybody's working on the same thing.

27. Do you ever feel that it becomes immersive in the sense that the external environment fades from your consciousness?

For sure!

And what happens - when and where does that happen, do you think? Is that after you've reached the synergetic state or is it the minute that you're in it?

Well, it's after a little bit of time in it, like maybe after an hour, an hour or two. And you just become disembodied.

Would you go as far as to say that that environment is your real environment, is your physical environment?

Yeah, yeah. You lose your body!

Do you think so?

No, because I remember that when I was hooking up with Linda (Dement) and Nancy and that's when Nancy was in Columbia and Linda was in Sydney and we started at midnight and I completely lost touch with my surroundings, it was only like a few hours later, that I started to hear the birds chirp. It was like being part of a ritual.

I would like you to tell me why you say that you're disembodied, why it's not embodied but in another mode?

Well, maybe that's a better description of it. But basically I'm saying that you lose awareness of your surroundings.

But this is immersed in the surrounding of the patcher screen so it's just another surrounding?

If you're just dealing with your surrounding screen, which in this case we were, you're just involved in the screen. That's where your attention is and with the exception of some sounds coming in, maybe some sounds from the streets or these types of other layers from the external, you don't really have any awareness of where you are.

[28]. But when you first used the word eavesdrop you were talking about eavesdropping on your own conversation or re-mediating your own conversation?

It's like this inner circle and you have this outer circle and how do you have access to that? So you make a decision about what this is. But if you are in the screen, connecting with somebody or maybe to other people, that's what you're doing, then it's all about that. Then you're lost in the screen and it's just that really intense connection. And that's really difficult to translate and then what you get if you maybe stream that and have people watch it [...] you don't really get a sense of that, of what's happening, because there's so many flows that are happening. It's actually not a physical activity, it's not like we're grabbing each other. There's no physically manipulating the space, it's primarily a mental activity. That's mediated through this computer.

[...] But you really feel the difference? I want to know what your experience is, so if you're telling me ...

Well, from an experiential point of view, I'm just thinking about, well, for myself it's almost getting in a trance so then you actually feel your body functions slowing down, you feel your breath slowing down, you get into a focused mode and there's very little physical action.

But that's just a change in the physicality?

Yes, but it really puts your body in a very sort of static state. Not necessarily a sad state, but your body definitely become very still.

37. Let's just call it, for the moment, let's just call it a theme, do you build them up, do you find yourself ever working with a kind of theme, that has a certain meaning attached to it?

Yes, for sure.

And you build upon that? Or is it something that is kind of constructive, undefined, and then it goes?

Well, like I said before, you, start from somewhere and then you build it up. That's part of the process of developing the concept through practice, to understand or to derive meaning from it, to make it more clear about what, and why you started to do that in the first place, and what is actually convenient to you. So if you say, well I'm going to work with this image and this piece of text, and you work with that, well it's like improvisation. It's like workshopping. I'm just thinking of parallels, you have theatrical laboratories where you're workshopping ideas and the ideas are not completely random, there's sort of a starting point, to my understanding, but there's a reason why people have assembled and then you work on that...

38. So that's my next question: what role does randomness play?

Well, you set up the guidelines, you set up the parameters so that you have some starting point and you have an understanding of the rules and that's not like a manifesto or something, but you have these parameters that you're working within. And that can be, well, it's like the ingredients that you're working with, right, so if there's an understanding of what it is, then you start. So you have some conceptual starting point and then you have some visual material or text material that you begin with. You have to keep yourself open enough so that there are surprises along the way.

But that's not necessarily randomly constructed?

But it starts to take a life of its own, you see? Because you have to start somewhere. This is just the way it's worked out, but if you have some place to start and it can be really loosely, then it starts to take a life of its own.

40. This life of its own, do you ever have the sense that there's also a kind of shared or collective interpretation of what it is? Does that matter?

What I found is that you can respond, you either get to that moment together of the 'aha' when you feel that there's been this breakthrough, this threshold, or you have these different moments of 'aha' and you respond, just based on what your personal preference is. Whatever you find pleasing.

Do you ever have a sense that the 'aha' moment is happening simultaneously, that on the other side the 'aha' is happening at the same time over the same interpretation?

Yes, yes. But at other times it can be like: "oh this was really great," and then you're responding to different things.

But it's the 'aha' that I'm interested in and whether this 'aha' is also something that has to do with interpretation? Or whether an 'aha' can happen without interpretation whether you can be somehow devoid of having any associative reading. Whether or not you're just seeing it on a purely, for example, visual level. Maybe without any kind of interpretation, reading or not, I don't know, this is a question I'm asking?

Well, there must be a level of beauty...

Well, define beauty...

Well, exactly define beauty, yeah!

[...] Have you ever thought about or have you ever anticipated the fact that, from the aesthetic qualities that are associated with you, (I mean I can see them in the patterns of what you do), that a new aesthetic will emerge that may change you?

Well, that's an incentive for working in a way besides individual practice [...] you hope that you teach each other, and you hope that by coming together and creating something, you hope that wouldn't have been possible without all that coming together.

Do you think there is anything qualitatively different with this experience than with any other artist who goes through the process of working on a project and over time changes because of that process and makes new work and it's different than the work before? Is there anything different about this experience or do you think that it's essentially the same thing?

No, I think the work is different, I don't think the work can be produced, the decisions or the conclusions can be produced. Those moments that you arrive at. I don't think that they could have been possible with just an individual trajectory. It needs to have several, that assemblage, that meaning.

Do you think that there is anything about being in these kinds of environments that increase skills for these things to happen in a normal environment?

To increase skills? Yeah. I think that working together over networks, because so many things are stripped and there's only a few ways of accessing each other, it's not multifaceted, it's not a physical relationship, right. So once you've stripped of those things, it puts a level of involvement, a commitment to it, and it actually heightens that level of commitment and the people that I work with understand that. Because there's a sense of responsibility and there's also a sense of consideration. [...]

[...] Are there ever moments where you lose any self-consciousness at all about your own contribution and you only see the collective input?

It's not a really simple response. I think that you have this preparation phase; part of the negotiation is hashing it out. Seeing where it goes, developing the idea and it goes in and out of you, just being completely focused on that exchange, and then stepping away and adding to it, adding to the partnering and coming together. So it alternates between you knowing, between you being involved in what you do, because everybody has these routines or methodologies, methodologies for acquiring information, or trying to provide some context for what you're doing. There are different ways of layering, making it more whole, filled up, so then you have to allow for that, you have to allow for the way that people work and then you put it together.

So that alternation is part of the dynamic, is part of what gives it life?

Yes.

46. How sensitive are you to the response of others to your input? Does it shape what you do?

[...] if you're working in a collaborative context, then you can't just have pockets of people working on their own things. You have to have these kinds of moments. But then you can't have talking all the time because then nothing gets done. So it's kind of trying to understand, or trying to find a balance between each individual working on their things, and when we have to come together and back and forth and back and forth. You don't want to get into a situation where every decision is by committee because it takes bloody forever, it doesn't work! So the way we set it up in the beginning is: okay, this is a collaborative process but this is not a democratic process, so, we don't know how it's going to go, but if it comes down to where to a decision has to be made, then we have the final say. [...] So each relationship is different, you just have to outline it and I don't know if there's just one particular way of working.

[61]. Do you feel that there's any sense that replaces your proprioception. But that can also take some kind of physical space when someone's close. When you're in a virtual space do you think there's anything else that kicks in, that replaces that sense?

I think it's like the synergy, the linking of, different elements together and how they function as a whole.

That's interesting. But not necessarily with the other person?

No, but let's say that if you're working together and you're creating this web, and then you change the speed of something, and that actually changes the whole thing. It's the same thing as proprioception, but it's not the same thing, it's a similar type of experience.

62. Do you feel a similar sense of timing, time, in connected spaces as in the physical world?

No, absolutely not!

It's a whole different time?

It's a whole different time, yeah.



ISABELLE JENNICHES (D/NL)

Isabelle Jenniches received her Master's degree in Scenography from the Academy of Applied Art in Vienna, Austria, and a postgraduate degree in Digital Media, Communication and the Arts from Media-GN, the Netherlands. Dedicated to a nomadic existence, a connection to the internet is her single most important constant. Recent bases have included Amsterdam, New York and California. In her work, which often evolves out of close collaborations with others, she exploits the social and emotional impact of new forms of mediated communication in theatrical situations. Real-time collaborative creation plays an important role in connected performance events and her work with musicians: she is a dedicated participant at Share, New York's grassroots laboratory for audiovisual experimentation and has performed at some of New York City's most popular and respected video performance venues, including the Kitchen, F:T:H at Remote Lounge, The Bunker at Subtonic, Eyewash and the Festival of Mixology hosted by Roulette as well as club transmediale Berlin. Her work has been shown in the Grand Theatre Groningen, Theater de Balie, Melkweg and Waag Society, Amsterdam; at DEAF, Dutch Electronic Arts Festival and at V2 in Rotterdam; Location One and Harvestworks, New York; Versionfest Chicago and on the World Wide Web.

7. [...] in 'Interfacing Realities,' you and Michelle devised a [...] strictly structured improvisation. Obviously it still leaves the door open for unpredictability but in a different way.

Yes, the media, with the Google image search [...] People came in and gave keywords. Then you don't know how your partner will feel, and if she's also in a creative downpour, and you get that in, that was fantastic! That was actually very, very successful. That was the most successful session I've ever had, I think.

[8]. So communicating with an audience may have different performance criteria, and so it's on a session per session basis?

It does!

It does. If you know there's an audience on the other side, that's invisible to you, it alters the way you play?

Of course.

Can you tell me how?

Well, it's, then it has to be graspable for somebody who's not doing it, so...

And that's something that you always keep then in the forefront of your making?

Yes, I do. I think that you do that when you set up the structure or when you plan what you're doing whereas if you're just playing as a rehearsal or something, it doesn't matter if the two of you or the three of you feel 'this is good', that it was good. But if you make it as a performance, if you as the performer feel good but the audience doesn't, then I would still think it kind of failed.

16. Do you generally work with media that you instantiate, or are you more likely to modify the media of the other people?

It depends. It's a little bit of a rule but it breaks down after a while. There's a little bit of a rule in the first fifteen minutes or so after somebody brought something in, you sort of let that alone, because you think: "oh, she had a certain goal in mind, and I should let her do that thing" but then once it's been running for a while, I have no hesitation.

And that rule, did anybody ever state that or is that just some kind of etiquette that's understood?

Yes. It's nice, actually almost everybody does it. Without exception!

That would be my experience as well but I didn't know it was an unspoken etiquette.

Totally, totally!

17. At what point do you feel the media is shared or collective, you just said after fifteen minutes but essentially would you say that?

Yeah, I think that after it hasn't been changed for a while.

20. How are you influenced by the choices that the other players make?

Greatly! I do react on the feed of others

Can you talk about that, or do you have an example?

Well, for example, if somebody is not doing anything for a while, then I really have this feeling like you're paddling in air, like 'hey, I'm running the show on my own or what, right?' So it's very important. I mean, a session has ups and downs, dips and activity and we're both exhausted or whatever, but it's very connected. Somehow you sense if the other one's fever is pitching somehow or not. And that is something very important, to keep me going.

How do you sense that?

I can see what changes.

22. Is there any way that you reach a synergetic dynamic or does that just sort of happen?

I think like in a band, you know, you can play with somebody or you can't, you know. You just never know. I think that's why I really like it. I have now performed and played with many people over the years and with some of them it was instantaneous really fun and good and challenging and going somewhere. With others it was, in a sense, not the same reflex and then you will never get there.

Whatever 'there' is...

Yeah, that magic moment...

Can you assign a kind of timeframe, how long that it might take on average to build up to that synergetic dynamic?

It can really be immediately.

It can?

Yeah, like I say with my friend Vatsky, in New York, the one with the audio waves, right? I mean we have such a minimal approach that whatever one of us brings in is huge. It's just a waveform, but the way the waveform is, can instantaneously take my breath away. That's really true. With him, and this very minimal approach, it's really nice in that sense. Very rewarding.

Because Michelle is famous for saying: it takes 12 hours...

Of course, but that's the other thing. Although with her too, I think that within two minutes, we have a nice patch. That's maybe not always what we're about, because with Michelle you know it's much more about content and it's not about a little waveform that moves to music. It's different and a little *harder*.

24. Alright. We're talking about creativity, does inspiration (whatever that is) in this kind of ephemeral, processual, collaborative presentation mode, does it feel similar or different to other non-collaborative experiences?

Yes, it's different.

Inspiration?

Yes, I think it's very different. It's more spontaneous ... like my solitary work, I really tend to brood over things, they really take a long time to make, to come up.

So inspiration isn't something that is instantaneous for you no matter what? You experience a kind of inspiration that can take a long time to ...

Yes, I mean, there's always these kind of sparks, little ideas and of course at moments when you suddenly know what to do, but in general, I think, and you know, this is also nice about this, that, okay, I now have two hours and in those two hours you have to be inspired, right? It has to happen there!

25. And you're saying two hours because you know you're giving a two-hour performance.

Yes. Usually, I connect with Michelle for four hours or something like that. If I have an idea then lying on the couch, it's too late.

You don't have the time to breathe, so you feel a kind of pressure to be creative?

No, well, maybe it's a kind of pressure, but you have acting techniques, you have ways to get inspired, to access your creative juices, right?

Yes, improvisors do this all the time.

Exactly, and maybe this is a bit like that.

So it is really fitting into an improvisational [mode]?

Yes, for me it is very much.

So then the next question: are your ideas and choices considered carefully or are they more spontaneous?

Spontaneous.

So do you build up over time a kind of catalogue, if you will, of choices?

Yes, things that you always do, or come back to, or...yeah definitely, experience...

38. What role does randomness play? Indeterminacy?

Yes, definitely. Yeah, a big role for me, like a chance, yeah.

So this preparedness, it's also preparing for randomness?

Yeah! Yeah! Very much. And fully accidental.

39. So if meaning is randomly constructed, how is it interpreted then, is it different?

I think it is also interpreted, or should be interpreted differently, I mean it's not reading a book, right.

How is it different from reading a book?

A book is finished.

40. Is there a moment when a composite collage is collective in its interpretation, meaning you have a sense that you're both understanding it in the same way?

Yes, I think that it is part of the magic moment.

Yes, so that is the synergy, you feel synergetic. It's also because you feel you're understanding it?

Yes, it makes sense for both of us.

43. Is there ever a narrative element that occurs...?

Yeah, I mean, there can be, but for DEAF [...] I thought there were tons of stories in that! They would just come and go, but there were tons of stories there. It was great, it was the story of us really doing *that* story, from images and stories, from memories. Everything. It just blew through. It did, yes.

45. Do you ever reach a zone of interaction where you lose self-consciousness and feel that you've become part of a collective process instead of that 'I' am about to do this?

Okay, when you like what you do, what is happening? You really lose the sense, I guess I really can get into it and I really merge with what happens.

46. What role does the response of the others on your input play in the performance?

Yeah, a great one, a big one. It refreshes it, and it gives me new ideas, makes it interesting.

Is that one of the reasons why you chose to do this in the first place, because you get that instant feedback?

Yes, well not only feedback, again, unexpectedness, I think.

62. You feel a sense of time, or timing, in connective space is the same as in a physical space? Or is it different?

It's different, time is very slow, things take much longer.

To arrive?

No, just anything.

Do you feel that your metabolism slows down?

Yeah, probably. We all know that you forget to eat and drink and all that.

67. But was it important for you that there was an audience, did it change you in any way, in what you contributed and how you contributed?

Yeah, sure! And it was very different from rehearsing too, because okay my partner is there, he's in this club, it's noisy and dark, he came in late, and he was really not very concentrated so I guess I can sense that. And yeah, I'm here, I'm concentrated so I kind of run the show for a while, until he settles down and has everything plugged in, so that's kind of neat. So for us it makes a difference. Because if I was there too, next to him, I probably would get freaked out, because he is freaked out. Because I'm here, I guess I can just maintain quiet and think, oh, well, I'll just start and do this and....

So this was really somewhat more of a presentation to an audience than about something that only the two of you can experience?

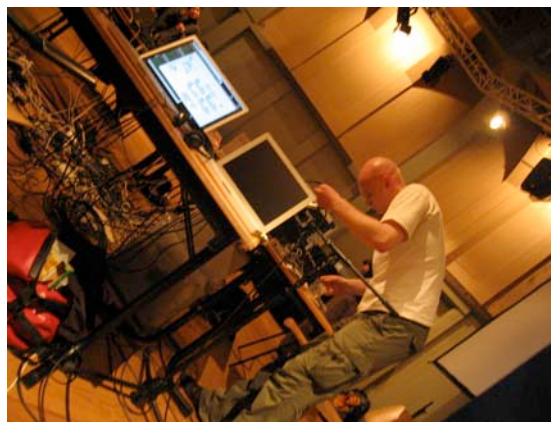
Well, that's part of it, but that's part of the performance. But the pure experience of that is usually during the rehearsals. But that's maybe again like with a band - you rehearse, you come up with a song; how do you do that? By trying to go to that place, that magic place, magic moment, right. And then the performance comes and you try to re-create it, or you hope you can re-create it.

Re-create? So that the real moments of creativity then are not when an audience is present, it is that intersubjective creation?

It's different, it's different, I think the creativity is there all the time but, I think that's why you rehearse; in the hope to find a system that allows you to initiate that. Easier or better, it helps you to find it...

And can you? When things change all the time [...] you can't really ever get back to where you were then?

Well, I think that you agree on the structure, you agree on the media, of course every time you play it's very different, and of course the form plays a role. For example, if my partner is distracted by real life then its very different from the rehearsal when we're both focused. But, yeah, we have come up with a plan that we both like, and if it's a good plan then part of it will be able to survive and some of what we had hoped will emerge through the work.



ARJEN KEESMAT (NL)

After studying Mechanical Engineering and Bewegings Technologie, Arjen received his master in interactive multimedia at the HKU(Utrecht-Holland)/University of Portsmouth (Great Britain) in 2002. He works as a multimedia artist and a freelancer for other artists and artistic projects. As an artist his interest focuses on the natural behaviour of people in their daily habitat, and to create systems that use that behaviour to enhance peoples presence, their interaction with others, and their perception of that space. Such systems usually have the form of interactive installations that are seamlessly integrated into the environment. Preferably in a public space. For creating these installations he uses a several technologies, varying from intelligent software and hardware/electronics to streaming and other network technologies.

6. What do you want to achieve in a collaborative session? Do you have any expectations of something that you want to achieve?

It's really creating together and the outcome can be anything. Sometimes it's really satisfying, sometimes it's frustrating. Usually, there's not a real goal for me. But then the real goal might be just working together, creating something.

20. How are you influenced by the choices of the people you are playing with?

Well, it's collaboration, usually jamming, improvising. It's a constant action-reaction and the nice thing is that you might react on something that someone else did but in the meantime the other person does the same so that's changing. Changes are revolving around each other which can be really surprising. It also depends on the pace sometimes. If the other person doesn't do so much sometimes for five minutes, maybe she went to the toilet, so then it's like building up your own stuff, and then all of a sudden they start to change stuff again, so I think it's a real play of action and reaction.

45. Do you ever reach this zone of interaction, this kind of synergy that we were talking about before, where you lose self-consciousness and you really feel that it's a totally collective process?

Yeah, in the best sessions, moments, there is definitely; but really depending on the person or persons that you're working with.

Is that a more rare experience?

For me is it a pretty rare experience.

How many times have you felt it?

I think, three or four times.

Have they been performances with audiences?

Yes [...] Well, not all of them, by the way, but at least one of them was, yeah.

What kind of role does the audience play for you in that? Do you think it heightens the possibility to have this special kind of synergy or does it take it away?

Well, I think it also goes back to some of the first questions - that the audience makes you aware of the fact of not being the only one looking at the outcome. I mean, if you're in a session with some others, without audience, you don't really feel the obligation to really reach this point, but if you know that an audience is watching you, you might feel motivated a little bit more, to be more, well, I lost the word, to dedicate yourself really to the session.

But it's interesting to think that an audience might enhance your experience with the other people because actually, it would be more commonsensical to think that it would be otherwise, that you would have that experience when you didn't need to think about third parties....

That also happened! Yeah, definitely! Like in test sessions, trying to get a way of working together, before working with the audience. Because you want everything to go right,

you're a little bit more cautious while performing with an audience, and then it is not so exciting anymore.

But what it does do is give that increase of tension which probably makes it more likely that you have that experience so it's a little bit...

It can go both ways. The dedication, the amount of dedication is usually a little bit bigger if there is an audience. You don't just walk away to get a coffee [...] or it would take a little longer before you do...

56. Do you feel that you have to take responsibility for your actions and reactions in a session, when you're making something?

Yes, but usually when there is an audience that I'm aware of.

And how does that change? How would your sense of responsibility change if there's an audience?

Well, since we're all responsible for the outcome and we want to show the audience something we really like.

Does that mean that you would take fewer chances, what does that actually mean in terms of what you would actually make?

It changes the way that you might be a little bit more cautious, but at the same time, if there isn't an audience and I accidentally did something that I didn't want to, I would feel the urge to say 'sorry' to the other.

Do you think the audience would catch it?

I think that's really hard, I don't know actually. I think that might be true, but that would probably require much more preparation in a session, working together. You can create a performance with KeyWorx that has a narrative structure or even dramaturgical structure, but that would require much much much more time. And that's not the way I work with KeyWorx [...] But that could be very well possible. And then our audience would probably catch it much better I think.

When you are working together and you hit these moments of synergy, is there a real collective aesthetic that emerges that really can't exist in any other time or anywhere else but in that moment? Is it its own aesthetic?

Yes, [...] and you might try to re-create it: it doesn't happen!

Exactly. Have you tried, sometimes?

Yeah, definitely.

But you don't get it back.

Well, there can be other moments, with other kinds of aesthetics that have the same feeling.

Are there moments of experiencing this collective aesthetic that changes you or that changes the way that you see things or the way that you might work on a piece or project?

Yeah, definitely.

Can you talk about that, can you give me an example?

Well, I don't really know an example right away, but I know that usually these moments happen with really simple basic things. I don't know how to explain this, but it's just something that you see and then you think: 'wow, it's so simple, so beautiful', that makes me aware of the fact that it should be simple.

When you're making something, and you're in this zone, do you feel as though the concept is coming from you or does it feel more that you're tapping into something that's out there?

In a session with other people?

Yes.

I think it's more tapping into another world, but that would be the starting point of trying to get my own concept in that world.

But it definitely feels like that 'aha' moment, you know, like when you've tapped into something other, it's not something that you have necessarily generated from you, but you've arrived there and you've arrived there together.

Yeah, I think it's a bit of both. Because if there is this moment, it definitely contains concepts of my own, of course. I don't feel it as my own concept...

62. Do you feel a similar sense of time or timing in connected space as you do in physical space?

No, I think it's completely different.

Can you explain?

If you're immersed in something in a session that might take a couple of hours, I sometimes completely forget the time and the space at that moment, so you might be playing for 2,5 hours and not being aware of it at all. In the meantime, the shops close [...] And in

that sense, I think it's a pity that most chat programs have these time codes [...] iChat tells every five minutes I think, it's this time. I think that pretty much disturbs me.



LODEWIJK LOOS (NL)

Lodewijk Loos studied music technology with a special interest in sound design using physical models. After some years of trying to master the guitar and becoming a composer his main interest changed to developing software for creative purposes. During his EMMA (European Media Master of Art) course he participated in several projects concerning interactive audio/visual installations (Eklektika). After his study he began working at Waag Society on the KeyWorx project as a programmer. Once in a while he showed up as an artist in a KeyWorx multi-user performance (DEAF03, eCulture fair), merely playing a part in the technical realization of the concept. As a "single user" artist he has been doing live video with the Zuiderzee orchestra and Herautronique. Experience on both technical as artistic level also helped him in supporting the KeyWorx user base. Current projects include the re-design and the "open sourcing" of the KeyWorx artist tools and ScratchWorx, a KeyWorx engined machine for educational purposes, which makes kids familiar with concepts like "collaboration" and "stage performance." A future interest is porting the software to other platforms.

6. What do you feel you achieve after a collaborative session?

Yeah, most of the time, especially the first times, I wasn't that content because, it was more like, I was very focused on the output, what was really seeable on the screen...

Do you ever leave a session with a sense of satisfaction that you had an experience that you had not had before, or that something happened that was particularly creative or inspiring or that sort of thing?

Yes, it happens, but not too much I guess because I'm still very much focused on the output on the screen. For instance Michelle sometimes can be really happy about how the whole process went and that's not really my point of view.

7. Well, even the users who are not programmers have a sense of satisfaction and happiness when that happens: no crashes; yeah, that was successful! Are you the kind of person that gets really excited by the prospect of unpredictability? By not knowing what might happen?

Yeah, it's always cool to see something beautiful and when I'm in a session with somebody else who makes something beautiful in my session then I'm more excited from the spectator's point of view; like: "wow, what's happening!"

I want to probe a little bit more... about making something beautiful. When it's really working, when the both of you are making something "beautiful" or if somebody else is making something beautiful and you're working in that session and you're going to add to it and change it slightly, do you have a sense that that 'making something beautiful' is unpredictable and that it's partly beautiful because it's unpredictable? Do you have a sense of that?

Yeah, I think if you make it *a next time*, of course, it becomes just a trick. But I still think that it's just as beautiful as it was, but some things are only beautiful the first time and then it becomes a trick for everyone and then every expert KeyWorx user thinks 'wow, he's just doing that, that's so simple', and then of course it becomes less beautiful but...

Oh, that's very interesting, so it's that first time, when it first happens?

Yes, but especially Eric and Arjen sometimes do some really cool things with keying or in combination with something else which results in a very cool visual output and then I'm interested in how they did it and just copied the patch and then next time I can sort of steal their idea.

Did you ever enter a session with a prepared patch? Something that you like and that works, and then you're going to ask that other person to then contribute to it or to change it?

Yeah, I don't know if I really did it but I think that that's a good thing to do because then you at least have something and for instance, when you're performing for some longer time, you can just make some basic patches from which you can build further. Yeah, I think that's a good thing to do, because it keeps things structured in some kind of way.

17. So do you ever reach a point where you feel that that media is shared or collective?

Hmmm, yeah. When somebody else instantiates a movie that I made or brought in first, then I feel it's shared and it's also funny sometimes that if you create a movie and after a few weeks or something, you see that the movie is shared among a lot of other users.

Because it's been transferred?

Yes, that's a very cool feeling.

45. Do you ever reach a zone of interaction where you lose your self-consciousness, or you lose the self-consciousness of what your own intention or your desire is and what you're trying to do? But you probably don't, because you're always looking to see what your contribution is so then you are very conscious of it all the time.

Yeah, well of course you lose it sometimes, the total control, because sometimes it's just driving you mad and then I'd rather like to start a new patch or something.

Because you just don't know where you are anymore?

Yeah.

Is it a feeling like you're lost somehow?

Yeah, (laughing).

And the only way to find yourself back again is to start a new patch and kind of sequentially building up an idea or an intention.

Yes. There's also, in a very big patch with a lot of layers, there are most of the time a lot of layers that are kind of useless, because the patch evolved, so it's very hard to keep it structured, and when all structure is gone and nobody still knows what's connected to what, then it's better to start again, I guess. Because I find it important that when you come up with an idea, like I want to control that, that it's still possible to realize that and if it's all gotten so confusing that you can't realize your ideas anymore, then you have to start a new patch I guess.

46. What role does the response of the others in a session to your input play in your performance? You already said that if someone uses your media, that makes you happy, but does that affect how you play?

Yeah. Even more when they don't use my media, then I probably try and bring something new in and try to put in new things until I get the feeling I'm being noticed and I get the feeling that people like it.

So it's important for you that people like it. So what if people don't like it but still want to use it, can you distinguish that?

Oh, yeah. Yeah, that's no problem at all.

So it's just the activity? It's somebody noticing what you've brought in and then really engaging with you? Playing with you?

Yes. What I think I'd like the best is when you're just doing very subtle things and yeah, I don't know if this is what I'm really doing, but you can of course do very 'lomp' things like putting a layer on top, and that way, you are really getting noticed, but that might result in somebody hiding your layer again and a sort of war starts about who's the top layer...

Does that happen to you?

No, not really.

But you think it could?

Yeah.

50. So how sensitive are you to the judgment of the others?

Well, that's why I find multi-user very hard to do because you really can't do something without getting a feeling that everybody agrees that you're doing it. And if you really don't care about what everybody else thinks about it, then you shouldn't go on the multi-user.