

A Malleable Metaphor: *Physarum polycephalum* as artistic and educational medium

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ABSTRACT

The slime mold *Physarum polycephalum* is a well-established model organism within fields of biology, physics and computing. It is also increasingly employed within art and design disciplines, pedagogic practices and public engagement activities as a vehicle for exploring questions of intelligence, agency and emergence. This work was presented at PhysNet 2015.

Categories and Subject Descriptors

A.0 [General]: Conference Proceedings; A.m [Miscellaneous]

Keywords

Physarum polycephalum, art and science, emergence, education, public engagement, interdisciplinarity, model, metaphor.

1. INTRODUCTION

The slime mold *Physarum polycephalum* is an efficient networker, capable of optimizing routes and solving navigational problems. Within its structure nutrients and environmental responses are distributed in a synchronous dynamic demonstration of unicellular communication and cooperation. It is, quite simply, a fascinating organism.

As both an artist and an educator I am interested in the organism's emergent and adaptive properties and since 2009 have developed a range of studies, methods and practices employing the slime mold as artistic medium, educational model and participatory metaphor. The intention of the work is to draw connections between complex systems in biological, technological and social contexts; to develop emergent educational platforms for self-organization and co-creation [1]; and to explore the roles of analogy and absurdity within interdisciplinary inquiry [2].

2. HYBRID METHODOLOGIES WITHIN ART AND SCIENCE

My work employs *Physarum polycephalum* as a 'co-creator' on a range of artistic and educational projects [3]. Modes of working stem from practice based research common within the arts and methods familiar within the sciences. Disciplinary and interdisciplinary methods are employed or appropriated as tools of inquiry, in many cases processes are as important as outcomes. Some works have a firm footing within scientific research, for example my time-lapse study depicted in Fig. 1, which pays homage to the classic maze experiment [4][5], whilst other works employ exploratory studio practices and participatory experimentation [6].

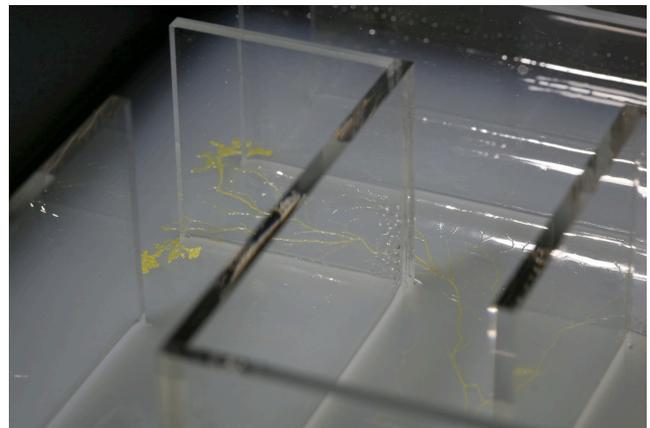


Figure 1. Heather Barnett, *The Physarum Experiments, Study No:19, The Maze* (film still), 2013.

3. EDUCATION AND ENGAGEMENT

Participation is also addressed through the *Physarum* workshops (Fig. 2) and public engagement activities working in a range of contexts, including formal education, science and arts festivals, and public workshops in community settings. Educational practices are informed by principles of emergence, methods of learning defined within projects to encourage a wide distribution of knowledge and ideation through multiple interactions, and to develop creative collaboration, leading to novel connections and unforeseen outcomes [7].



Figure 2. Open adult *Physarum* workshop at GenSpace community laboratory, New York, 2011.

Less conventional participatory activities include *Being Slime Mold*, a collective participatory experiment originally designed as a means of extending public engagement with exhibits at the BioDesign exhibition in Rotterdam in 2013, through observation, simulation and enactment of the slime mold (Fig. 3). Since then the experiment has been adapted to a range of contexts including a Financial Times conference (modeling synchronous organizational systems) [8], Open Embodiments Conference (embodying biological behaviors) and a conference on complexity in a digital age (as a form of biomimicry in action) [9].



Figure 3. *Being Slime Mold* Enactment, at BioDesign exhibition, Rotterdam, 2013.

4. COLLABORATION AND CO-CREATION

As a means of connecting slime mold researchers and encouraging collaboration, in 2009 I established an online network, The Slime Mold Collective (slimoco) [10]. The aim of the site was to encourage open sharing of knowledge, methods and practices across disciplinary divides and outside of academic hierarchies. Growing steadily in this time as new ‘nodes’ find the ‘network’, membership consists of a broad spectrum of disciplinary perspectives, including (but not limited to) painting, urban studies, biology, computing, teaching, architecture, hybrid

design, management, social studies, innovation, community arts (Fig. 4) and philosophy – with several cross-disciplinary collaborations borne from communications across the network.

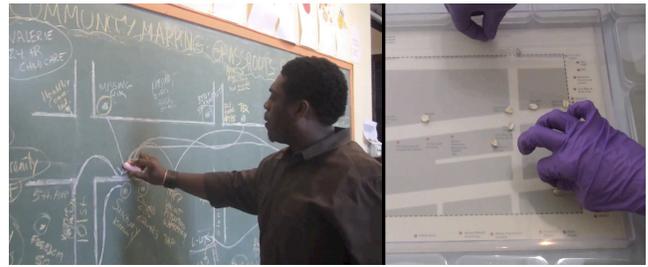


Figure 4. Community mapping project with slime mold by Blaine O'Neill, a member of The Slime Mold Collective.

Within academic research groups and within non-institutional networks, such as The Slime Mold Collective, there is an enormous body of critical and creative inquiry working with slime molds, and in particular *Physarum polycephalum*. Methods, intentions and modes of inquiry may vary, but common ground may be found amongst the questions asked of the ‘many-headed’ slime mold and its evident value to diverse fields of research as a malleable model and metaphor.

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