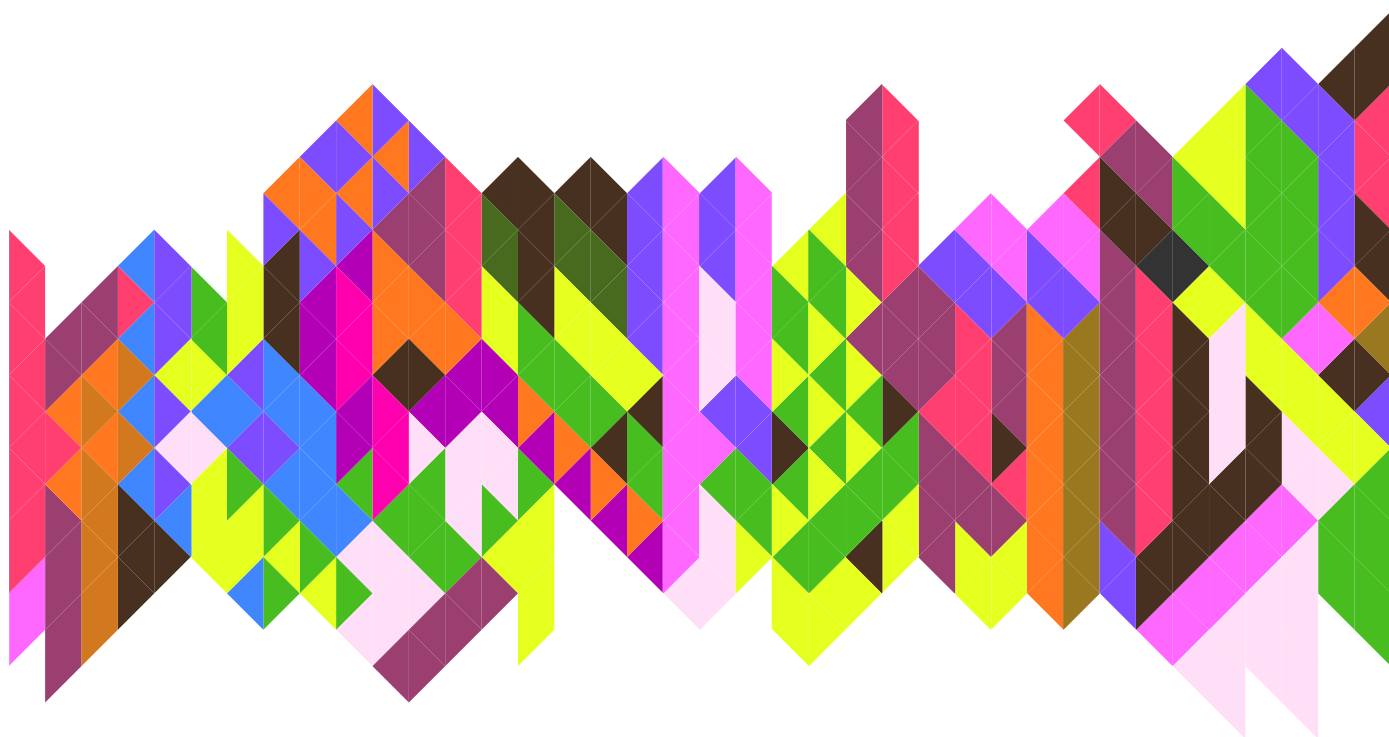


The Fibreculture Journal

DIGITAL MEDIA + NETWORKS + TRANSDISCIPLINARY CRITIQUE



Issue 17 : Unnatural Ecologies

edited by Michael Goddard and Jussi Parikka



OPEN HUMANITIES PRESS

The Fibreculture Journal is an Open Humanities Press Journal.



The LOCKSS System has the permission to collect, preserve and serve this open access Archival Unit.



The Fibreculture Journal is published under a Creative Commons, By Attribution-Non Commercial-No Derivative License.

ISSN: 1449 – 1443 , Published in Sydney, Australia

Fibreculture Publications/The Open Humanities Press 2011

The journal is peer reviewed as per section 4.3.4 of the Australian
HERDC Specifications.

About the Fibreculture Journal

The Fibreculture Journal is a peer reviewed international journal, first published in 2003 to explore the issues and ideas of concern to the Fibreculture network.

The Fibreculture Journal now serves wider social formations across the international community of those thinking critically about, and working with, contemporary digital and networked media.

The Fibreculture Journal has an international Editorial Board and Committee.

In 2008, the Fibreculture Journal became a part of the Open Humanities Press , a key initiative in the development of the Open Access journal community.

The journal encourages critical and speculative interventions in the debate and discussions concerning a wide range of topics of interest. These include the social and cultural contexts, philosophy and politics of contemporary media technologies and events, with a special emphasis on the ongoing social, technical and conceptual transitions involved. More specific topics of interest might include:

- :: informational logics and codes
- :: the possibilities of socio-technical invention and sustainability
- :: the transdisciplinary impacts of new media technologies and events in fields such as education, the biosciences, publishing or knowledge management
- :: information and creative industries, media innovation, and their critique
- :: national and international strategies for innovation, research and development
- :: contemporary media arts
- :: new forms of collaborative constitution made possible by contemporary media
- :: software and hardware develops in relation to the social
- :: networks :: media change, convergence and divergence
- :: the use of contemporary media in socio-technical interventions

The Fibreculture Journal encourages submissions that extend research into critical and investigative networked theories, knowledges and practices.

The Fibreculture Journal values academic scholarship in the field, and demonstrates this through the publication of refereed articles. The journal is fully supportive of Open Access communities and practices, and is committed to contemporary metadata provisions and uses. It is also open to expanded notions of scholarship which might include collaborative hypertexts, database compositions, and low-band electronic installations that experiment with the philosophy, politics and culture of information and communication technologies.

ISSN: 1449 – 1443 Published in Australia

Publisher: Fibreculture Publications/The Open Humanities Press 2011

The journal is peer reviewed as per section 4.3.4 of the Australian HERDC Specifications.

Editorial and Management Committees

editor

Andrew Murphie (University of New South Wales, Sydney)
contact editorial : fibreculturejournal@gmail.com

journal manager

Mat Wall-Smith (University of New South Wales, Sydney)
contact manager : fcjmanager@gmail.com

editorial and management committee

Susan Ballard (Otago Polytechnic, Dunedin, New Zealand)
Chris Chesher (University of Sydney)
Alice Crawford (University of New South Wales, Sydney)
Michael Dieter (University of Melbourne)
Kelli Fuery (Newcastle University, Australia)
Gillian Fuller (University of New South Wales, Sydney)
Gary Genosko (Lakehead University, Canada)
Thomas Markussen (Kolding Design School, Denmark)
Lizzie Muller (University of Technology, Sydney)
Anna Munster (University of New South Wales, Sydney)
Elena Razlogova (Concordia University, Montréal)
Ingrid Richardson (Murdoch University, Perth)
Kate Southworth (iRes Centre for Research in Interactive Art and Design, University College, Falmouth, UK)
Mat Wall-Smith (University of New South Wales, Sydney)
Mitchell Whitelaw (Canberra University)

editorial board

Belinda Barnet (Swinburne University of Technology, Melbourne)
Sandra Buckley (Management Consultant and Independent Scholar, Montréal)
Danny Butt (National Institute of Creative Arts and Industries, University of Auckland)
Linda Carroli (Harbinger Consulting, Australian Network for Art and Technology)
Felicity Colman (University of Melbourne)
Melinda Cooper (University of Sydney)

Editorial Board

Belinda Barnet (Swinburne University of Technology, Melbourne)
Sandra Buckley (Management Consultant and Independent Scholar, Montréal)
Danny Butt (National Institute of Creative Arts and Industries, University of Auckland)
Linda Carroli (Harbinger Consulting, Australian Network for Art and Technology)
Felicity Colman (University of Melbourne)
Melinda Cooper (University of Sydney)
Kate Crawford (University of New South Wales, Sydney)
Sean Cubitt (University of Melbourne)
Sher Doruff (Amsterdam School of the Arts)
Pia Ednie-Brown (RMIT, Melbourne)
Mary Flanagan (Hunter College, New York)
Terry Flew (Queensland University of Technology, Brisbane)
Phil Graham (Queensland University of Technology, Brisbane)Melissa Gregg (University of Queensland, Brisbane)
Ross Harley (University of New South Wales, Sydney)
Maren Hartmann (University of the Arts, Berlin)
Robert Hassan (Swinburne University of Technology, Melbourne)
Larissa Hjorth (RMIT, Melbourne)
Teri Hoskin (Artist/electronic writing research ensemble. Adelaide)
Troels Degn Johansson (Danish Design School, Copenhagen)
Paul Jones (University of New South Wales, Sydney)
Andrew Kenyon (University of Melbourne)
Julian Kücklich (Saarbrücken)
Elaine Lally (University of Western Sydney)
Geert Lovink (University of Amsterdam)
Niall Lucy (Curtin University, Perth)
Adrian Mackenzie (Lancaster University)
Lev Manovich (University of California, San Diego)
Graham Meikle (Stirling University, Scotland)
Adrian Miles (RMIT, Melbourne)
Catherine Mills (University of Sydney)
Esther Milne (Swinburne University of Technology, Melbourne)
Timothy Murray (Cornell University, New York)
Brett Neilson (University of Western Sydney)
Jussi Parikka (Anglia Ruskin University, Cambridge)
Andy Polaine (Interactive Media Consultant, Offenberg/University of New South Wales, Sydney)
John Potts (Macquarie University, Sydney)
Melinda Rackham (Australian Network for Art and Technology)
Philip Roe (Central Queensland University, Bundaberg)
Ned Rossiter (University of Western Sydney, Sydney)
John Scannell (Macquarie University, Sydney)
Sha Xin Wei (Concordia University, Montréal)
John Sutton (Macquarie University, Sydney)
Tiziana Terranova (Università di Napoli L'Orientale', Italy)
David Teh (National University of Singapore)
Darren Tofts (Swinburne University of Technology, Melbourne)
Gregory L. Ulmer (University of Florida)
José van Dijck (University of Amsterdam)
Jill Walker (University of Bergen)
Shujen Wang (Emerson College, Boston)

The Fibreculture Journal: Issue 17 2011 Unnatural Ecologies.

Editorial : Issue 17 2011 Unnatural Ecologies **1**

Michael Goddard
University of Salford

Jussi Parikka
Anglia Ruskin University

FCJ-114 Towards an Archaeology of Media Ecologies:
'Media Ecology', Political Subjectivation and Free Radios **6**

Michael Goddard
University of Salford

FCJ-115 Autocreativity and Organisational Aesthetics in Art Platforms **18**

Olga Goriunova
London Metropolitan University

FCJ-116 Media Ecologies and Imaginary Media:
Transversal Expansions, Contractions, and Foldings **34**

Jussi Parikka
Anglia Ruskin University

FCJ -117 Four Regimes of Entropy:
For an Ecology of Genetics and Biomorphic Media Theory **51**

Matteo Pasquinelli
Queen Mary University of London

FCJ-118 Faulty Theory **69**

Matthew Fuller
Goldsmith University

FCJ-119 Subjectivity in the Ecologies of Peer to Peer Production **82**

Phoebe Moore
University of Salford

The Fibreculture Journal

DIGITAL MEDIA + NETWORKS + TRANSDISCIPLINARY CRITIQUE

// issue 17 2011 unnatural ecologies



Editorial

Michael Goddard
University of Salford

Jussi Parikka
Anglia Ruskin University

This issue is an exercise in media ecology that is paradoxically unnatural. Instead of assuming a natural connection to the established tradition of Media Ecology in the Toronto-school fashion of Marshall McLuhan, Neil Postman, and the work of scholars involved in the Media Ecology Association (http://www.media-ecology.org/media_ecology/), our issue stems from another direction; its theoretical orientation is more inspired by the work of Felix Guattari and engages with several overlapping ecologies that are aesthetico-political in their nature. It stems from a more politically oriented way of understanding the various scales and layers through which media are articulated together with politics, capitalism and nature, in which processes of media and technology cannot be detached from subjectivation. In this context, media ecology is itself a vibrant sphere of dynamics and turbulences including on its technical level. Technology is not only a passive surface for the inscription of meanings and signification, but a material assemblage that partakes in machinic ecologies. And, instead of assuming that 'ecologies' are by their nature natural (even if naturalizing perhaps in terms of their impact on capacities of sensation and thought) we assume them as radically contingent and dynamic, in other words as prone to change.

The concept of media ecology was revived in 2005 by Matthew Fuller's theoretically novel take on the idea. His *Media Ecologies: Materialist Energies in Art and Technoculture* set out to map the 'dynamic interrelation[s] of processes and objects, beings and things, patterns and matter' (Fuller 2005: 2) in a culture where the relation between materiality and information has been redefined. Steering clear of earlier celebrations of media as informational environments which dismiss any connection with the physical as for example with the cyberculture of the 1980s and 1990s – Fuller is keen to map out how we can develop a material vocabulary for media ecological processes. The roots of such a vocabulary—that bends itself to the intensive connections of pirate radios and voice, the photographic medium and the Internet as well as such informational entities as memes—come from Whitehead, Simondon, Nietzsche as well as Guattari and contemporary writers such as Katherine N. Hayles. What emerges is a different genealogy for theories of media ecology.

What was demonstrated already in Fuller's take on the concept was a special appreciation of material practices involved in establishing the regimes of media ecologies. Media ecologies are quite often understood by Fuller through artistic/activist practices rather than pre-formed theories, which precisely work through the complex media layers in which on the one hand subjectivation and agency are articulated and, on the other hand, the materiality of informational objects gets distributed, dispersed and takes effect. Media ecological platforms can be seen to range from network environments for philosophy and media activism as in Rekombinant (<http://www.rekombinant.org>) to art platforms on the net such as Runme.org (<http://runme.org/>). Related themes can be detected in the various negotiations of nature being remixed, resurfaced, revisualized or sonified through media environments. Examples include Natalie Jeremijenko's work, the Harwood-Yokokoji-Wright Eco Media collaboration (featured in Parikka -this Issue), biological art projects such as Amy Youngs's The Digestive Table (2006, <http://hypernatural.com/digestive.html>), the work of activist/artistic groupings like Critical Art Ensemble, the Yes Men or the Wu Ming foundation and various bio-art projects of recent years. In all these cases a dynamic media ecology is generated, incorporating natural, technical and informational components and giving rise to singular processes of subjectivation that are equally an essential part of the media ecology.

For Fuller, the question of affordances is a central way to understand the interaction of various regimes of materiality. Affordance is a term that stems from J. J. Gibson's ecological psychology and is attributed to the capacities for interaction of living bodies. For Fuller, this concept is applicable more widely, and affording capacities became a methodological pathway to understanding various art/ecology-practices:

Just as capacities of thought, of being, are made in lived bodies, in complex and delicately conjoined tissues and processes, and just as powers are inherent in all matter, materialism also requires that the capacities of activity, thought, sensation, and affect possible to each composition whether organic or not are shaped by what it is, what it connects to, and the dimensions of relationality around it. (Fuller 2005: 174)

In this sense, artistic work, whether engaging with animal bodies, technological assemblages, or their combinations and relations, can be seen as an ecological – or even ecosophical – mapping of potential universes of enunciation as well as sensation (see also Parikka, 2010).

More than a question of interpretation, media ecology addresses the crucial question of activity; what do media do? The classical media ecological theorists already asked similar questions about the effects of media environments on the human sensorium and mental capacities but increasingly, with this more recent wave of media ecological interests, we are attached not only to questions concerning such molar formations as the human organism, but also the molecular fluxes in which bodies are formed. We are as interested in ecologies of non-humans, whether on the microbial scale or on the scale of techno-scientific objects. All demand a new attitude tuned to matter and defined through its vibrancy (see Bennett, 2010). We are interested in bodies, and in forces (in)forming those bodies, in their state of emergence; the processes in which and through which bodies consolidate, stabilized, form, and further deform.

In our view, theories of media ecology are closely linked with practice in the sense that theory itself is viewed as a media ecological practice. Fuller's book opens with a key statement regarding theory itself as media ecological

practice : 'This is a media ecology made in bits of paper' (Fuller, 2005: 1). His contribution to this issue extends this concern. He explores the generativity of 'Faulty Theory' - theory given over to the potential of the indeterminable, the anomaly, the 'pata-physical'. Sites of enunciation, or indeed ecologies of enunciation in which both theory and practice take place become concerns from a media ecological perspective. The question of disciplines, institutions and, increasingly, of transdisciplinarity, haunts not only the theoretical mindset but the wider frameworks in which processes of subjectivation are to be situated within techno-capitalist contexts. As Matthew Fuller outlines in this issue, theory itself is a thick, materialist practice. It is far from immaterial or simply representational, displaying a unique affordance for 'graspings and imagination'. The articles in this issue unpack related concepts and practices of media ecologies from a variety of perspectives.

In Goddard's article, 'Towards an Archaeology of Media Ecologies', an effort is made to distinguish the emergent paradigm of media ecologies (with an "S" as Goddard might say) from 'actually existing' media ecology. The appearance of Fuller's book was understandably unsettling for those of the media ecological school and certainly marks at least a profound rupture in the media ecological paradigm, if not a total break. The article goes on to examine one of the key sources for this break, namely Felix Guattari's engagements with both media and ecology. It especially focuses on the way Guattari's media ecologies were energised by and engaged with free radio movements in both Italy and France. The media ecological dynamics surrounding free radios were inseparable from the radical political movements from which they emerged and of which they were a key component. The article traces how, with the decline of these political energies, these ecologies could no longer be sustained. Nevertheless, in examples ranging from the London pirate radio analysed so brilliantly in Fuller's book to forms of tactical and sovereign media, the political potential of media ecologies remain active and effective in contemporary digital conditions, especially in relation to new and diverse modes of subjectivation.

The politics of media ecology is picked up by Phoebe Moore in her article 'Peer to Peer Production: Revolution or Subjectivation?'. Moore addresses P2P forms of organization in the context of media ecology, and mobilizes the force of change as part of the investigation; how is real social change possible, and how do alternative forms of organization – such as horizontal, non-hierarchical networks among peers – challenge and function in neoliberal digital media culture? Also proceeding from a Guattarian perspective to the multiple ecological spheres in which aesthetics, organization, political economy and activism co-function in complex ties, her article addresses media ecology as an analysis of subjectivation; responding to the question of how to invent such forms of productive relations which fall outside the proprietary logic and function according to an 'open source model.'

Michel Bauwens, one of the theorists Moore draws upon, has elaborated the political economy of peer to peer as an ecology of peer production, governance and property - of the 'Commons'. This is a crucial theme for contemporary political networks and social production. In her text on the concept of autocreavity and artistic media ecological platforms Olga Goriunova elaborates the specific modes of production/creativity that go hand-in-hand with ecologies of software and other technical platforms. Goriunova emphasises the work of art platforms in offering catalyst forces, coherence and maintenance to aesthetic processes and practices. Defining the notion of 'art platforms' as 'a terminological solution for describing a website or an ensemble of human-technical objects reflexive of their own processual devising, which act as a catalyst in the development of an exceptionally vivid cultural or artistic current,' she is able to address the multiplicities of forces engaged in what could be called the organization of creativity. Again, we can bluntly state that of course there has not been a lack of such organization in the midst of the hype surrounding creative industries, but Goriunova maps out the more 'dirty' and processual forms of activities that might self-conceptualise themselves as art—if not necessarily always as "art". The article employs the idea of self-

organization, but again in a Guattarian wake flags it as a process of differentiation; again, we are dealing with media ecologies that both resist hylomorphism (the technicality of such platforms is not detached from the artistic, the ideational), and employ an ‘unnatural’ ecology characterized by metastability, to use a term from Gilbert Simondon.

Jussi Parikka’s text on nature reframed as media also employs theoretical support from Simondon among others to argue that projects such as EcoMedia (Harwood-Wright-Yokokoji) and Dead Media (Garnet Hertz) encourage a wider understanding of media. Here, media ecology is taken to be the investigation of the complex transformations, transactions and reemployments of “nature” as a force from which our understanding of media stems. The art projects themselves act as catalysts for a non-human perspective on contemporary media, and natural processes are used to investigate the idea of media as an affordance—less a substance than a process of affording spatial and temporal relations between people, but also between things non-human. In this context, Parikka’s text maps the relations between media ecology and media archaeology as well, through the question of the complex temporal timescales in which media and ecology take place.

It seems that we increasingly need such perspectives that are able to analyze and understand natures and technologies as interlinked; for example the environmental contexts of information technology where it is quite rarely realized that social networks might run on coal powered energy [1], or in the way in which supposedly immaterial information technologies are a key origin of a future ecocatastrophe of toxic chemicals [2], or in the way in which natures and cultures are constantly mediated in networks of relations of political ecology, in what Jane Bennett calls aptly ‘a knotted world of vibrant matter’ (2010: 13).

Hence, the translations and transpositions from biology to media ecologies and spheres need careful scrutiny. Such a critique is addressed in Matteo Pasquinelli’s article ‘Four Regimes of Entropy: For an Ecology of Genetics and Biomorphic Media Theory’. He investigates the figures of the biological inherent in our current vocabulary of political media cultures, and in concepts from multitudes to swarms. He also focuses on how inherently we have grown to think of the digital, and code, through notions that suggest a seeming universality adopted from biological research, especially from DNA. Pasquinelli argues for a detailed, multi-layered genealogy of entropy not only in relation to digital code, but also from the viewpoints of the biological, as well as the mineral. Hence, the article argues that instead of enthusiasm for ‘code’ as the final referent for media ecologies of network culture, we should turn to energetics, understanding political ecologies in the light of the life of micro-organisms. In order to avoid code reductionism, what is proposed is a “wetter” approach to bodies, and ecologies of machines of heterogeneous kinds, through which, methodologically, one is able to map the biopolitics of network organisms and their reliance on the processes of abstraction at the core of this ontology of code. In this way one can also provide alternatives that are more material, more heterogeneous in their ecology.

The final contribution to this issue, and its concerns with the materiality of media ecologies, comes from Matthew Fuller’s already mentioned essay entitled ‘Faulty Theory.’ Rather than continue the exploration of media ecologies began in his earlier work, Fuller turns his attention towards “theory,” finding it every bit as thick and material as the other more obviously material ecologies dealt with in this issue. In particular, Fuller is interested in the anomalous theories and thinking machines of figures such as Gordon Pask, Alfred Jarry and Charles Fort, as modes of theory that do far more than disturb conventional distinctions between theory and practice. Rather, as “faulty theories” for which error is not so much a fault to be corrected as a fault-line to be followed, they constitute experimental engagements with the world that are perhaps more practical than practice itself since they consider language, ideas,

thinking machines and the other components of theory as materials to be worked with rather than as representational abstractions. More than this, rather than just working through words and their conventional supports of the printed page, faulty theory also engages with, in Fuller's terms, 'forms of ideational devices, robots, blags, and the ruses of things, rules and jokes.'

As the articles in this issue argue, media ecologies is able to provide methodological clues with which to map the messy ontologies of contemporary culture—the translations and transpositions between nature and technology, but also between subjectivity and media, the social and the political, and the political economy in which such energetic processes take place. The articles show how media ecology, as a direction within media studies, has resonances with other new ideas—in new materialism, media archaeology and political philosophy—that deal with new kinds of bodies. These bodies are not always human, not always solid, and not always clearly visible/representable. Media ecology is able to analyse a media culture that is becoming less about apparatuses and solids, and more about waves, vibrations, streams, processes and movements. As such, media ecology is expanding the possibilities of where media studies can go.

References

- Bennett, Jane. *Vibrant Matter. A Political Ecology of Things* (Durham: Duke University Press, 2010).
- Fuller, Matthew. *Media Ecologies. Materialist Energies in Art and Technoculture* (Cambridge, MA: The MIT Press, 2005).
- Parikka, Jussi. *Insect Media. An Archaeology of Animals and Technology* (Minneapolis: University of Minnesota Press, 2010).

Endnotes

[1] See 'Facebook faces campaign to switch to renewable energy,' *The Guardian* September 1, 2010 . See also the Harwood and Yokokoji project *Coal Fired Computers* (2010) which brilliantly maps the long networks in which coal and computers are interlinked. <http://www.avfestival.co.uk/programme/10/events/coal-fired-computers>. See also 'Pits to Bits,' Matthew Fuller interviewing Graham Harwood (July, 2010).

[2] See Garnet Hertz's *Dead Media Project*, , and also Mel Chin's *Revival Field* in which he uses specific plants to clean the soil of toxics through the process of 'hyperaccumulation' where the plant sucks heavy metals to itself.



FCJ-114 Towards an Archaeology of Media Ecologies: 'Media Ecology', Political Subjectivation and Free Radios

Michael Goddard
University of Salford

Introduction

While Matthew Fuller's book entitled *Media Ecologies* has had a considerable impact on research into new media, digital art, alternative media and other spheres, it still remains relatively little-known in mainstream media studies and contains great potential for further development in relation to many fields of media research. Media Ecology is a term that has existed for some time at the peripheries of media studies and theories, and is notably associated with the celebrated media theorist Marshall McLuhan. There is, however, a certain perhaps necessary confusion around the deployment of the term 'Media Ecologies' in Fuller's book, partly because of the differences in this deployment from the already existing field of research known as 'Media Ecology', a US-based post-McLuhan stream of media research of which the most well-known figure is undoubtedly Neil Postman. The following essay will therefore touch upon these differences, before giving a different genealogy of *Media Ecologies* via the encounter between the rethinking of Ecology or rather Ecologies undertaken by Felix Guattari and the free radio movement in the 1970s, focusing especially on *Radio Alice*.

The Differences Between Fuller's Media Ecologies and 'Actually Existing' Media Ecology

That the contrast between *Media Ecologies* the abovementioned school of Media Ecology is not some exercise in Derridean hair-splitting is made abundantly clear by reading the review of the book that was published in *Afterimage* entitled 'Taking Issue', by Lance Strate, who is a central participant in the media ecology movement. Strate quotes the old saying that a rose by any other name would smell as sweet and as a good McLuhanite feels compelled to reject its wisdom: 'If, on the other hand, you believe that the medium is the message, and that a good name is better than riches, then you may understand my concern over the title of Matthew Fuller's new book, *Media Ecologies*' (Strate, 2005: 55).

Strate goes on to add that Fuller's book has little to do with Media Ecology, for which he gives a useful history, stating that it came out of conversations between Marshall McLuhan, Eric McLuhan and Neil Postman, dating back to 1967. He also points out that Fuller's treatment of this tradition amounts to four pages of the introduction to *Media Ecologies* (2-5) and that Fuller fails to make any reference to any of its key texts. In many ways it is unsurprising that Strate would feel put out by Fuller's book and feel the need to provide a corrective history of the term with which he has been working for some time. His review makes abundantly clear how alien the book *Media Ecologies* is to this tendency and it is clear that it is coming from quite different theoretical sources and significantly operates within an equally different discursive universe. Beyond the quibbling over history is a real disagreement about media ecologies themselves that, as Fuller rightly points out, are treated by the media ecology tradition through an amalgam of humanism and technological determinism. While the work of McLuhan can and has given rise to numerous possible interpretations ranging from a literary, anecdotal and metaphorical anthropocentrism to Friedrich Kittler's radical machinic anti-humanism, the work of at least some of the media theorists associated with the media ecology school retreats from the more radical implications of McLuhan's work into a type of liberal humanism, an operation that has both conceptual and political implications.

Consider, for example, the work of Neil Postman. In both *Amusing Ourselves to Death* (1987) and the more recent *Technopoly* (1993), Postman adopts a form of populist technophobia that only seems to maintain from McLuhan his anecdotal style and love of metaphor and whose only antidote to the Behemoth of technological domination seems to be a quite conservative notion of pedagogy. In other words, it is an approach to media that would be better characterised as pre rather than post-McLuhanite (in the art historical sense of pre-Raphaelite) in that the full co-implications of human beings and technology is treated in a monolithic, rather than in a complex way. This is strangely reminiscent of the Frankfurt School culture industry model of mass culture, whose one-sided and somewhat paranoid account of mass media has been the subject of important critiques. I would not extend this criticism to all practitioners of 'actually existing media ecology', some of whom seem to be relatively insightful scholars of McLuhan and the other theorists who Fuller characterises as a 'vivid set of resources' (Fuller, 2005: 4). [1] But the point I would like to make is that Fuller's book is a much needed intervention into this field, which in some respects can be seen as so many footnotes to McLuhan's original and still important insight that the medium is the message. As opposed to both the humanist conservative environmentalism of the media ecology school, Kittler's anti-humanist technological determinism and the creative industries invocation of information ecologies as a free market strategy, Fuller injects a much needed materialism, politics and complexity into the term media ecologies as he uses it:

The book asks: what are the different kinds of [material] qualities in media systems with their various and particular or shared rhythms, codes, politics, capacities, predispositions and drives, and how can these be said to mix, to interrelate and to produce patterns, dangers and potentials? Crucial to such an approach is an understanding that an attention to materiality is most fruitful where it is often deemed irrelevant, in the immaterial domains of electronic media. (2)

What is crucial in this passage is the emphasis on the materiality of the supposedly immaterial components of media systems, including digital ones, and the association of this with politics since this not only distinguishes media ecologies from media ecology but from a good deal of media and specifically new media theory as well, precisely by proposing a material politics of media. In fact this is really the key reason why there is such a distance between media ecologies and media ecology: whereas the latter is closer to environmentalism, that is, the consideration of media systems as parts of relatively stable environments for which normative ideas about human beings form the centre, 'media ecologies' is closer to ecological movements. As Fuller describes this difference:

Echoing the differences in life sciences and various Green political movements, 'environmentalism' possesses a sustaining vision of the human and wants to make the world safe for it. Such environmentalism also often suggests ... a state of equilibrium ... Ecologists focus more on dynamic systems in which any one part is always multiply connected, acting by virtue of these connections and always variable, so that it can be regarded as a pattern rather than simply an object. (4)

This ecological as opposed to environmental conception of media ecologies (and the plural is also essential here) is necessarily activist, intervening in established knowledges about media systems and tracking the radical dynamisms that constitute them, however stable they might appear to be. This goes some way to explaining why the subsequent chapters of the book have varying methodological approaches and are engaged with radically diverse objects ranging from a single piece of Net Art, 'The Camera that Ate Itself' (55-84) to the London pirate radio network (13-54) that is perhaps the most systematic and recognisable 'application' of the concept of media ecologies. The second part of this essay will therefore switch from discussing what Media Ecologies is not, in other words the media ecology movement, to one key source for what it is, that is a radically material and political intervention into established approaches to media including that of media ecology that, as Fuller acknowledges, draws substantially on the work of Felix Guattari.

The Three Ecologies and the Free Radios

Fuller acknowledges Guattari as a key reference not only for rethinking ecology but also media ecologies in the following terms: 'Guattari's use of the term ecology is worth noting here, first, because, the stakes he assigns to media are rightly perceived as being profoundly political or ethico-aesthetic at all scales. Aligning such political processes with creative powers of invention that demand "laboratories of thought and experimentation for future forms of subjectivation" (Guattari's words), also poses a demand for the inventive rigor with which life among media must be taken up' (5). At the risk of leaping ahead to the conclusion of this essay, I would argue that at the very least, Fuller's book is a fine example of applying just such an experimental attitude and just such inventive rigor to the field of media in order to, in Deleuzian terms, create a new concept of media ecologies, while nevertheless drawing productively but never slavishly on existing resources such as Guattari's rethinking of ecologies as part of what he calls ecosophy.

Guattari was increasingly drawn towards ecology in his later writings, most explicitly in his essay *The Three Ecologies* which begins with the often quoted phrase from Gregory Bateson: 'There is an ecology of bad ideas, just as there is an ecology of weeds' (Guattari, 2000: 19). In the context of this essay, one might also be tempted to add the hypothesis of an ecology of bad media systems. The point is, first of all, that ecology should not be limited to the physical systems studied by environmental science but ought to include (at least) two other levels, namely a social ecology of social relations and a mental ecology of subjectivity or rather the production of subjectivity. Guattari was well aware of the suspicion that tended to be applied to this third level whether from the 'hard' sciences or 'hard' politics, but for him this dimension is key to any truly ecosophic project. His treatment of these objections to taking seriously the incorporeal but material dimension of mental ecology in which sensibilities, intelligence and processes of desire take place, what Guattari referred to as vectors of subjectivation, is worth quoting in full:

I know that it remains difficult to get people to listen to such arguments, especially in those contexts

where there is still a suspicion—or even an automatic rejection—of any specific reference to subjectivity. In the name of the primacy of infrastructures, of structures or systems, subjectivity still gets bad press, and those who deal with it, in practice or theory, will generally only approach it at arm's length, with infinite precautions, taking care never to move too far away from pseudo-scientific paradigms, preferably borrowed from the hard sciences: thermodynamics, topology, information theory, systems theory, linguistics etc. ... In this context, it appears crucial to me that we rid ourselves of all scientific references and metaphors in order to forge new paradigms that are instead ethico-aesthetic in inspiration. (Guattari, 2000: 25)

Among other things, this dimension of subjectivation is crucial as it is the actual site where politics takes place, where new modes of sensibility and intelligence can be experimented with, mutate and transform themselves. No amount of dire warnings, backed up as they may be by hard empirical evidence, about such phenomena as global warming, for example, are ever going to result in the slightest political change without addressing these vectors of subjectivation, especially if they are merely imposed as part of a larger culture of fear and the cultivation of toxic and paranoid forms of subjectivity. Subjective ecologies and social ecologies are indissociable from physical environments and exist in complex relations of co-determination which any truly media ecological or even ecological practice needs to take fully into account.

But Guattari's rethinking of ecology is not merely relevant for this reason but also because it was itself intimately involved with a rethinking of media themselves, which function for Guattari as just such vectors of subjectivation and perhaps the most important ones in contemporary societies. As I stated earlier, Guattari was profoundly affected by his encounter with and participation in the Free Radio movements in Italy and France. In *The Three Ecologies* as in elsewhere in his work this encounter forms the basis for thinking what he referred to as the post-media era that he saw as potentially emerging from the rubble of mass media society: 'An essential programmatic point for social ecology will be to encourage capitalist societies to make the transitions from the mass-media age to a post-media era in which the media will be appropriated by a multitude of subject-groups capable of directing its resingularisation. Despite the seeming impossibility of such an eventuality, the current unparalleled level of media alienation is in no way an inherent necessity. It seems to me that media fatalism equates to a misunderstanding of a number of factors' (Guattari, 2000: 40). The most relevant of these factors for our purposes is the third one Guattari mentions which is 'the technological evolution of the media and its possible use for non capitalist goals, in particular through a reduction in costs and through miniaturisation' (41).

From a contemporary perspective it is hard not to see everything from digital video to activist cybercultural projects such as *Indymedia* to digital networks in general to the various forms of social software as some kind of technological realisation of this call for a post-media era, that seems to have become at once less impossible and less utopian. However, as I have argued elsewhere, this would be a far too technologically determinist understanding of Guattari's concept of ecologies that pays too little attention to the crucial domain of mental ecology. In fact today's miniaturised media are highly unstable ecologies where there is a clash of impossible forces and unpredictable vectors, ranging from the reformulation of capitalism as cognitive to the experimentation with new mediated modes of subjectivation. What this shows is that far from being utopian or too abstract, Guattari's conception of a post-media era is at once perfectly real and in need of further complexification, which is just what Fuller's concept and practice of media ecologies sets out to do. Therefore rather than examining the contemporary media ecologies referred to above, the last part of this essay will focus in more detail on the Free Radio movement of the 1970s, specifically to bring out its impact on Guattari's concept of a post-media era that is in turn influential on Fuller's book. Nevertheless, much of what Guattari was able to discern in free radio stations like *Radio Alice* is of great relevance to the

media ecologies of contemporary new media forms, as Fuller's account of London pirate radio in *Media Ecologies* amply demonstrates.

Millions and Millions of Alice's in Power

In the late 1970s Guattari devoted several texts to the phenomena of popular free radio and especially that taking place in Italy. 'Why Italy' (Guattari, 1996a: 79-84) is the essay that gives the clearest indication of why he considered this such an important phenomenon. First of all there is the concrete context, that he had been asked to introduce the French translation of *Alice é il diavolo*, principal documentation of this radio station and its political trajectory, interested him since it is a radio of an explicitly situationist and Deleuzo-Guattarian inspiration, thereby constituting an auto-referential feedback loop between his own rhizomatic thought and media subversion. More importantly, *Radio Alice* and its conflict with the apparatus's of state control that eventually resulted in a massive wave of repression, demonstrates very clearly how the media are a key site of struggle over the contemporary production of subjectivity; in Guattari's terms, despite its apparent economic and technological backwardness at that time, Italy was the future of England, France and Germany. The molar aspect of this is that the polarising of politics into the mutually reinforcing duality of state violence and terrorism was developed first of all in Italy before being applied elsewhere and could be seen as a embryonic of the global economy of fear under which we live today. However, what is behind this polarisation was the emergence of a new regime of consensus or control in which all previously existing forms of resistance such as trade unions or the communist party would be tolerated provided they fit into the overall regime of consensual control, for which they provide very useful tools for subjective reterritorialisation: the historic compromise between the Italian communist party and the social democrats being just one example of this process. Guattari does not really go into detail about the specific political history of the Italian far left which had its roots in the 1960s development of Operaismo or 'Workerism', then developed via the interactions between an increasing radicalisation of both proletarian forms of action and workerist theory, the emergence of the student movement in the late 1960s, accompanied by the political expression of new subjectivities such as the feminist and gay liberation movements and ultimately the emergence of what became known as Autonomia or the 'area of autonomy.' [2]

According to Guattari, the groups associated with this tendency and that still advocated violent rupture with the consensus embodied in the historic compromise would be hunted down and eliminated, with no pretence of liberal models of justice or legal rights, which was indeed what happened first in Italy and then in Germany. But Guattari was less interested in terror or state repression, while considering them important issues demanding responses on a 'molar' or representational political level. His primary interest in this essay is in the molecular revolution that was taking place around *Radio Alice*, one that the emerging consensual state apparatus was not able to tolerate. For Guattari, this is not a mere shift away from traditional apparatus's of struggle such as the communist party which have become completely compromised with the state in favour of new micropolitical groupings such as gay liberation or the women's movement; these new groupings are no less susceptible to becoming reterritorialisations, finding their institutional place in the manufacture of consensus. As he puts it, 'there is a miniaturisation of forms of expression and of forms of struggle, but no reason to think that one can arrange to meet at a specific place for the molecular revolution to happen' (82). While Guattari does not state it explicitly here, this corresponds very closely to the rejection of even micropolitical identities or political forms such as organisational Autonomia enacted by *Radio Alice*; it was not just a question of giving space for excluded and marginalised subjects such as the young, homosexuals, women, the unemployed and others to speak but rather of generating a collective assemblage of enunciation allowing for the maximum of transversal connections and subjective transformations between all these emergent subjectivities. Guattari refers to

Alice as ‘a generalised revolution, a conjunction of sexual, relational, aesthetic and scientific revolutions all making cross-overs, markings and currents of deterritorialisation’ (84). Rather than pointing to a new revolutionary form, the experimentation of *Radio Alice* was a machine for the production of new forms of sensibility and sociability, the very intangible qualities constitutive of both the molecular revolution and the post-media era.

Guattari is somewhat more specific about these practices in the essay ‘Popular Free Radio’ (1996a: -78). In this essay he poses instead of the question of why Italy, that of why radio? Why not Super 8 film or cable TV? The answer, for Guattari is not technical but rather micropolitical. If media in their dominant usages can be seen as massive machines for the production of consensual subjectivity, then it is those media that can constitute an alternate production of subjectivity that will be the most amenable to a post-media transformation. Radio at this time had not only the technical advantage of lightweight replaceable technology but more importantly was able to be used to create a self-referential feedback loop of political communication between producers and receivers, tending towards breaking down the distinctions between them: ‘the totality of technical and human means available must permit the establishment of a veritable feedback loop between the auditors and the broadcast team: whether through direct intervention by phone, through opening studio doors, through interviews or programmes based on listener made cassettes’ (75). Again the experience of *Radio Alice* was exemplary in this regard: ‘We realise [with *Radio Alice*] that radio constitutes but one central element of a whole range of communication means, from informal encounters in the Piazza Maggiore, to the daily newspaper—via billboards, mural paintings, posters, leaflets, meetings, community activities, festivals etc’ (75). In other words, it is less the question of the subversive use of a technical media form than the generation of a media or rather post-media ecology, that is, a self-referential network for an unforeseen processual production of subjectivity amplifying itself via technical means. [3]

As Guattari points out this is miles away both from ideas of local or community radio in which groups should have the possibility on radio to represent their particular interests and from conventional ideas of political radio in which radio should be used as a megaphone for mobilising the masses. In contrast, on *Alice*, serious political discussions were likely to be interrupted by violently contradictory, humorous and poetico-delirious interventions and this was central to its unique micropolitics. It was even further removed from any modernist concern with perfecting either the technical form of radio (for example through concerns with perfecting sound quality) or its contents (the development and perfection of standard formats); listening to the tapes of *Radio Alice* is more than enough to convince about this last point. All of these other approaches to alternative radio, that is the local, the militant and the modernist, share an emphasis on specialisation; broadcasters set themselves up as specialists of contacts, culture and expression yet for Guattari, what really counts in popular free radio are ‘collective assemblages of enunciation that absorb or traverse specialities’ (75). What this meant in practice was that on *Alice* an extreme heterogeneity of materials was broadcast tending towards a delirious flow of ‘music, news, blossoming gardens, rants, inventions, ... messages, massages, lies’ (Berardi et al 2009: 82). Innovations of *Radio Alice* included the instantaneous reporting of news in the form of callers telephoning directly into the radio broadcasts from demonstrations and other political events and the lack of centralised control over what voices or ideas could be expressed, a philosophy of openness that would later be taken up by Independent Media Centres in the digital era. This meant in practice that calls denouncing the radio producers as ‘filthy communists’ coexisted with calls to support a current demonstration to the caller who rang up just to declare that whoever stole his bicycle is a ‘son of a bitch’ (82). In short there was a delirious flow of expression that disturbed the social order less through its content than by opening up channels of expression and feedback between this free expression and current political events culminating in the radio becoming a key actor in the explosive political events of Bologna in March, 1977, at the climax of which the radio station itself was targeted by the police and several of its key animators arrested. [4]

What this type of radio achieved most of all was the short-circuiting of representation in both the aesthetic sense of representing social realities and in the political sense of the delegate or the authorised spokesperson, in favour of generating a space of direct communication in which, as Guattari put it, 'it is as if, in some immense, permanent meeting place—given the size of the potential audience—anyone, even the most hesitant, even those with the weakest voices, suddenly have the possibility of expressing themselves whenever they wanted. In these conditions, one can expect certain truths to find a new matter of expression' (76). In this sense, *Radio Alice* was also an intervention into the language of media; the transformation from what Guattari calls the police languages of the managerial milieu and the University to a direct language of desire:

Direct speech, living speech, full of confidence, but also hesitation, contradiction, indeed even absurdity, is charged with desire. And it is always this aspect of desire that spokespeople, commentators and bureaucrats of every stamp tend to reduce, to filter. ... Languages of desire invent new means and tend to lead straight to action; they begin by 'touching,' by provoking laughter, by moving people, and then they make people want to 'move out,' towards those who speak and toward those stakes of concern to them. (76-77)

It is this activating dimension of popular free radio that most distinguishes it from the usual pacifying operations of the mass media and that also posed the greatest threat to the authorities; if people were just sitting at home listening to strange political broadcasts, or being urged to participate in conventional, organised political actions such as demonstrations that would be tolerable but once you start mobilising a massive and unpredictable political affectivity and subjectivation that is autonomous, self-referential and self-reinforcing, then this is a cause for panic on the part of the forces of social order, as was amply demonstrated in Bologna in 1977. Finally, in the much more poetic and manifesto-like preface with which Guattari introduces the translation of texts and documents from *Radio Alice*, he comes to a conclusion which can perhaps stand as an embryonic formula for the emergence of the post-media era as anticipated by *Radio Alice* and the Autonomia movement more generally:

In Bologna and Rome, the thresholds of a revolution without any relation to the ones that have overturned history up until today have been illuminated, a revolution that will throw out not only capitalist regimes but also the bastions of bureaucratic socialism ... a revolution, the fronts of which will perhaps embrace entire continents but which will also be concentrated sometimes on a specific neighbourhood, a factory, a school. Its wagers concern just as much the great economic and technological choices as attitudes, relations to the world and singularities of desire. Bosses, police officers, politicians, bureaucrats, professors and psycho-analysts will in vain conjugate their efforts to stop it, channel it, recuperate it, they will in vain sophisticate, diversify and miniaturise their weapons to the infinite, they will no longer succeed in gathering up the immense movement of flight and the multitude of molecular mutations of desire that it has already unleashed. The police have liquidated Alice—its animators are hunted, condemned, imprisoned, their sites are pillaged—but its work of revolutionary deterritorialisation is pursued ineluctably right up to the nervous fibres of its persecutors. (Guattari, 1978: 11) [5]

This is because the revolution unleashed by *Alice* was not reducible to a political or media form but was rather an explosion of mutant desire capable of infecting the entire social field because of its slippery ungraspability and irreducibility to existing sociopolitical categories. It leaves the forces of order scratching their heads because they don't know where the crack-up is coming from since it did not rely on pre-existing identities or even express a future pro-

gramme but rather only expressed its own movement of auto-referential self-constitution, the proliferation of desires capable of resonating even with the forces of order themselves, which now have to police not only these dangerous outsiders but also their own desires. This shift from fixed political subjectivities and a specified programme is the key to the transformation to a post-political politics and indeed to a post-media era in that politics becomes an unpredictable, immanent process of becoming rather than the fulfilment of a transcendent narrative. In today's political language one could say that what counts is the pure potential that another world is possible and the movement towards it rather than speculation as to how that world will be organised.

Apart from anticipating many of the subsequent problematics of the counter-globalisation movement, what this citation tells us most of all about the post-media era is that it is not something that can be given in advance; it is instead a process of the production of subjectivity, the becoming of a collective assemblage of enunciation whose starting point is the emptiness and coerciveness of the normalising production of subjectivity that the mass media currently enact. This already gives us some indications as to what aspects of digital network culture might be able contribute to this emergence of a post-media sensibility and which elements in contrast merely help to add sophistication and diversity to normalisation processes under the guise of interactivity.

Guattari's engagement with free radio was not, however, limited to *Radio Alice* but was also played out in relation to range of free radio initiatives in France from 1977 to 1981. In fact it was the events surrounding *Radio Alice* and its repression that led to Guattari's first involvement with Radio Verte. According to Thierry Lefebvre, a press conference set up by Guattari, on the 11th of July, 1977, in order to denounce the imprisonment of Franco Berardi, who was coincidentally provisionally released that very day, was instead used to announce that Radio Verte would begin broadcasting the next day at 7 AM (Lefebvre, 2008: 115). The next day a few people showed up in a borrowed office with the minimum of equipment necessary to begin broadcasting: two microphones, a turntable, a small mixing desk and a 100 watt transmitter. The transmission was oriented more to spontaneity than professionalism and went out live; three of the people present were Italians formerly involved with *Radio Alice*, thus making the radio experiment directly linked with the recent experience of free radio in Italy, reinforced by making this the topic of the first emission: 'They spoke of Franco Berardi, about the conditions of his arrest, the situation in Bologna, the appeal of intellectuals against repression in Italy. Little by little the discussion turned towards the necessity for the breaking up of the monopoly of the airwaves, on the problem of the right to speech of immigrant workers' (*Le Mattin de Paris*, July 1977, cited in Lefebvre 2008: 116-117). Guattari's involvement with French free radio was not limited to this particular station and he was also involved with Radio Libre Paris and later Radio Tomate amongst others. However, his involvement was not limited to particular stations but also in contributing to the organisation of the free radio movement association, ALO, not without causing some controversy with some radio animators claiming that Guattari and his collaborators were attempting to impose an Italian political model on the French radio experience, before a similarly radicalised political plane effectively existed in France.

As the ALO became increasingly closely aligned with the nascent emergence of commercial radio initiatives, Guattari became disillusioned with the experience of free radio in France, concluding in 1980 that '[Today] the fanatics of radio for radio's sake, the mythomaniacs of "new communications", occupy centre stage. A new sickness, benign but tenacious, "radio-maniacal" narcissism, is spreading like an epidemic' (334). If the experience of French free radio, for Guattari, became less a radio of the movement than a movement for radio fetishists, it nevertheless demonstrated Guattari's pragmatic and active involvement in the field of radio as a potentially radical media ecological practice. It also demonstrated the ecological interdependence of radio experimentation and its socio-political context. In particular, it pointed to the marked differences between the radical political and social movements of Autonomia in

Italy and their equally drastic repression and the far more middle of the road political situation of France, epitomised by the election of the Socialist party of François Mitterrand, an election supported by several intellectuals formerly associated with the far left like Régis Debray, after ironically reinventing himself as the founder of 'mediology.' The 1980s, with their ascendancy of global neo-liberal policies on both the right and the left, and a concomitant deregulation, commercialisation and globalisation of the entire mediascape including radio, marked the end of a certain political conception of free radio; a fairly bitter result for those involved with radical free radio movements, who saw their efforts to break state monopolies over the airwaves succeeding for the benefit of a new generation of transnational commercial media operators, perhaps one of the key reasons that Guattari referred to the early years of this decade as 'the years of winter.' Nevertheless the desire to appropriate the airwaves for other forms of expression was one that would be continually reactivated in different forms in a variety of contexts, including in the experience of London pirate radio that Matthew Fuller engages with in *Media Ecologies*.

While London pirate radio is not based on any leftist political agenda, in other respects it fully embodies Felix Guattari's call for a micropolitical radio, facilitating the expression of subjectivities, in this case largely but not exclusively Afro-Caribbean youth, who are otherwise excluded from expression via the mainstream media. Referring to Simon Reynolds' account of pirate radio in *Energy Flash* (1998), Fuller points to the way that pirate radio operated as a feedback loop between the creative chaos of the radio transmissions themselves and the 'hardcore massive' at home who were directly integrated into the radio transmissions via call-ins, SMS messaging and a range of extra radio phenomena including clubs, parties, flyers and graffiti, drugs and new modes of DJing and musical expression. Part of what Fuller does is to provide both an inventory of all the elements whether technological, subjective or environmental, out of which pirate radio is constituted, as well as mapping their material relations. While far more detailed in dealing with technical devices such as turntables or mobile phones than Guattari's writings on free radios, Fuller nevertheless provides an analysis that similarly shows the interdependence of radiophonic and extra-radiophonic elements, including the surrounding urban environment that made London pirate radio possible. For Fuller the combinations between the various components that make up pirate radio constitute a machinic phylum with a tendency to become self-organising, which is a tendency that was no less evident in the case of *Radio Alice*. The sound of pirate radio is not only independent of its technical and social components but also 'articulates them, gives them sensual, rhythmic and material force' (Fuller, 2005: 19). Fuller also shows how a media ecological approach while not excluding 'content' has to locate this content in the multiple connections of the media ecology considered as a mega-machine that articulates different technologies, humans, voices, subjectivities, experiences, radio waves, laws and regulations, digital networks, money and the relations and feedback between all these elements. In summary, pirate radio is, for Fuller, 'always more than it is supposed to be ... it is made and makes itself, by its always awesome capacity to flip into lucid explosions of beats, rhythms, and life' (53). In this way there is a direct 'transmission' between the 1970s experience of political free radios as engaged with by Guattari and the very different experience of contemporary pirate radio, linked less by any similar content or political aspirations than by a related machinic phylum able to crystallise a production and expression of subjectivity in a specific socio-political environment.

Conclusion

Guattari's account of *Radio Alice* as a media ecology serves as an exemplary statement of media ecological practice, emphasising its political, subjective and ethico-aesthetic dimensions: in other words, Guattari's conception of media ecology, and I would also argue Fuller's, is less the question of the subversive use of a technical media form than the generation of a media or rather post-media assemblage, that is a self-referential network for an unforeseen proces-

sual and political production of subjectivity amplifying itself via technical means. The post-media field envisaged by Guattari is today being realised in complex ways in a number of domains ranging from media art projects operating on a largely aesthetic register to politically motivated media labs to reinventions of the potentials of earlier media forms such as television, radio and journalism. Usefully, Joanne Richardson in her introduction to the *Anarchitexts* collection of essays on global digital resistance distinguishes at least three post-media domains of tactical media, sovereign media and autonomous media culture. In her definition of the second of these territories of post-media praxis, she provides a description highly resonant with the project of media ecologies as formulated both by Guattari and more recently by Fuller:

Tactical media knows the pleasures of media-in-itself and recognises the value of participation, but is still focused on a message and aims to reach an audience, however alternative. By contrast, sovereign media have learned to feign ignorance, ignore the demand for usefulness and the oppressive category of the audience. They mediate no information and are not the condition of possibility for any exchange. They communicate themselves, not to an audience of spectators but to a peer of equals, partners engaged in the same activity. (Richardson 2003: 11-12)

This is not to argue the sovereign media should be the 21st Century media ecological paradigm par excellence but to emphasise that the media ecological or post-media era envisaged by Guattari is now a complex and diverse reality, characterised by a multiplicity of bifurcating projects as expressed by the range of contributions to the *Anarchitexts* collection itself, which contains more than fifty contributions from at least as many post-media projects. This complexity and liveliness of contemporary media ecological praxis is also what this current issue of *Fibreculture* aims to make its own critical contribution to.

Endnotes

[1] See, for example, Paul Levinson, *Digital McLuhan: A Guide to the Information Millennium* (London: Routledge, 1999).

[2] For an exemplary history of Italian Autonomist Marxism see Steve Wright, *Storming Heaven: Class Composition and Struggle in Italian Autonomist Marxism* (London: Pluto Press, 2002).

[3] This does raise the question of why Guattari did not see the same potentials in the political use of video and cable television that was being pioneered at the time particularly in the USA by collectives like Paper Tiger television. It could be that Guattari was not aware of these experiments taking place as they were largely in the USA, partly facilitated by the legal requirement for cable providers to allow space for public access television. It could equally be the case that Guattari did not see radical forms of television as providing the same scope for the activation of subjectivity as was the case of radio, due to the spectacular nature of television as a medium.

[4] An account of these events and the role of *Radio Alice* in them can be found in Berardi et al, 2009: 83-87.

[5] Translated from the French by the author of this article.

Biographical Note

Michael Goddard is a lecturer in media studies at the University of Salford. His current research centres on East European cinema and media culture, particularly in Poland from the 1960s to the present as well as on radical media in the spheres of film and video, radio, post-punk musics and cyberculture. He has also done substantial research into Deleuze's aesthetic and film theories, Italian post-autonomist political thought and media theory and the cinema of Raúl Ruiz.

References

- Berardi, Franco (Bifo), Marco Jacquemet and Gianfranco Vitali. *Ethereal Shadows: Communications and Power in Contemporary Italy*, trans. Jessica Otey. New York: Autonomedia, 2009.
- Fuller, Matthew. *Media Ecologies: Materialist Energies in Art and Technoculture*. Cambridge, Mass: MIT Press, 2005.
- Guattari, Félix. 'Préface: Des Millions et des Millions d'Alice en Puissance.' In: Collectif A/Traverso. *Radio Alice*, Radio Libre. Paris: Delarge, 1978, 6-12.
- Guattari. *Soft Subversions*, ère Lotringer ed., David L. Sweet and Chet Weiner trans. New York: Semiotext(e), 1996a.
- Guattari. *The Guattari Reader*. Gary Genosko ed. Oxford: Blackwell, 1996b.
- Guattari. *The Three Ecologies*, trans. Ian Pindar and Paul Sutton. London: Continuum, 2000.
- Lefebvre, Thierry. *La Bataille des Radios Libres 1977-1981*. Paris: Nouveau Monde éditions, 2008.
- Levinson, Paul. *Digital McLuhan: A Guide to the Information Millennium*. London: Routledge, 1999.
- Postman, Neil. *Amusing Ourselves to Death*. London: Methuen, 1987.
- Postman. *Technopoly: The Surrender of Culture to Technology*. New York: Vintage Books, 1993.
- Reynolds, Simon. *Energy Flash: A Journey through Rave Music and Dance Culture*. London: Picador, 1998.

Richardson, Joanne. *Anarchitexts: A Subsol Anthology*. New York: Autonomedia, 2003.

Strate, Lance. ' "Taking Issue": Review of Media Ecologies: Materialist Energies in Art and Technoculture,' *After-Image* 33.3 November, 2005: 55-56.

Wright, Steve (2002). *Storming Heaven: Class Composition and Struggle in Italian Autonomist Marxism*. London: Pluto Press, 2002.



The LOCKSS System has the permission to collect, preserve and serve this open access Archival Unit



The Fibreculture Journal is published under a Creative Commons, By Attribution-Non Commercial-No Derivative licence.



OPEN HUMANITIES PRESS

The Fibreculture Journal is an Open Humanities Press Journal.



FCJ-115 Autocreativity and Organisational Aesthetics in Art Platforms

Olga Goriunova
London Metropolitan University

Introduction

Cultural production on the Internet has developed numerous dynamics and consistencies that drive considerations of creativity, organisation and the inter-relations of media. This article presents and briefly discusses the concept of an *art platform*, a particularly resonant form of such cultural production. The article enquires into the ways that powers of operation are constituted by particular kinds of social, technical, aesthetic and ethical forces. The media ecological approach to which this special issue is devoted can be seen as engaging with these forces. Such forces are discussed here via the concepts of *autocreativity* and *organisational aesthetics*. These concepts are in turn traversed and amplified by the particular qualities and potentials of art platforms. [1]

The concepts offered in this article, in particular that of autocreativity, allow connections to be made between diverse approaches to creativity: 'creative industries' jargon and psychological endeavors, philosophical accounts of aesthetics and autonomist Marxist analysis of current cultural production. Creativity is often discussed either with an expectation of exploitation or an overly optimistic sense of freedom found via collaboration (or market value). However, either way the actual practices that thrive on the energy that can be called creative are obscured and unappreciated. *Autocreativity*, as a concept, aims for a kind of vision that is able to see the creative activity that is repressed by both dominant celebratory discourses and overly critical discussions. There is another side to this. Creative cultural activity often takes place in zones that have not yet achieved significance. I will argue that creative activity can become capable of attaining cultural visibility—along with aesthetic brilliance—through the amplification provided by the energy of autocreativity. The theoretical apparatus offered in this article allows for a differentiation between, and recognition of, some of these various energies, as they are manifested in digital folklore and humour, and in absurd and inappropriate experimentation and research. At the same time, various forces and practices of organisation need to be taken into account. I will suggest that such energies, forces and practices in turn generate *art platforms* as new forms of cultural production.

Here aesthetics is understood, in a Nietzschean fashion, as a form of life. Artistic production becomes a mode of labour within, as well as an organisation of, life. Artistic production can be put to work in spheres far removed from the cultural realms described by traditional aesthetics, and exploited by interests far removed from any transformative artistic ethos (Guattari, 1995). How, then, is aesthetic production being constituted today, even as it is constantly appropriated? What are the processes that guide its development from an undefined and emergent state to its actualisations? In a response to such questions, I will discuss outline a general concept of art platforms. I will not describe any of these art platforms themselves in any depth. However, I will use online publication to link to some examples. Here, an 8-bit music platform, Micromusic.net, a software art repository, Runme.org, a network of people, Dorkbot, or 'doing strange things with software' or surfing clubs such as Nasty Nets or Supercentral, are given as examples of art platforms. I suggest that the practices, publics, and means of self-organisation involved in such art platforms, along with their ways of doing and making, and the languages born within these, are very much like those that an organism might produce in order to make an aesthetic difference. In short, art platforms help enunciate cultural forms of life. The clearest markers of art platforms are the in-between-ness of the work involved, and the way in which these art platforms emerge from the mundanity and repetition of culture, and head towards the brilliance of art at its best.

Art Platforms

How does art become art? The ways in which culture in general takes place, how it disseminates, and in which art enacts itself within the general contexts of culture, are now irreversibly 'co-produced' by networked media technology. In order to understand this, we need to look at the ways in which aesthetic forms of life cut through processes of subjectification and organisation, how they mobilise and reinvent network systems and cultures, and how those, in turn, condition and co-create the forms of life involved. Everyday digital objects and gestures—such as file uploads and downloads, form filling, data submissions, postings, connection failures, protocols, scripts, software affordances and modification parameters—are all plugged in to contemporary aesthetics as I have begun to describe it here. All these digital objects and gestures co-construct the ways in which the individual, cultural, and social spheres are produced, organised and disrupted. Art platforms both conform to, and are part of, this overall development, but they also stand out from them in very striking ways.

Art platforms are complex but we can begin simply: an art platform is a network platform that produces art. An art platform differentiates itself from other portals and art entities by the number of the relations it establishes, and by those that emerge dynamically from within it. As a self-organised, and self-organising, institution, an art platform is flexible. It is also informed and co-developed by users and the aesthetic work that it propels. An art platform can also take the form of a crossroads at the intersection of several systems or actors of different scales and as such may be a momentary expression of creative power. In practical terms, for example, an art platform can be a stand-alone website that, together with other actors, forms an ecology of aesthetic production. However, it might also take place as a subsection of a large participatory platform, or even as a space in-between a corporate service, artists' work, hacking, collaborative engagement and a process of aesthetic generativity. In all these cases, whoever, an art platform engages with a specific current of techno-social creative practices and aims at the amplification of its aesthetic force.

The 'art platform' therefore describes a Website or other ensemble of human-technical objects in terms that are reflective of their own processuality. The art platform acts as a catalyst in the development of a vivid cultural or artistic current. As a locus of activity carried by such a current, it induces the propagation of aesthetic phenomena that transcend the inventory of their formation. As such it is a system for which the behaviour cannot be deduced from the trajectories of its elementary components.

The aesthetic phenomena that emerge through art platforms are of a character that is 'natural' to technical networks. Be it software art, 8-bit music, short stories, 'primitive' web pages, short videos, the scripted behaviours of 3D-objects or recorded re-enactments, the aesthetic phenomena that emerge through art platforms are integral to the art and cultures of the Internet age. More specifically, they delve deep into the exploration of the *materiality* of digital media.

Art platforms are also able to engage with living practices in their blurred and 'dirty' forms, often in-between the more commonly defined arenas of culture and art. Despite their name, art platforms often work with practices that may not conceive of themselves as art per se, but which might yet become art. As such, art platforms aim at mapping wide assemblages of ideas, territories, and invisible practices, in the processes of their emergence, yet these always in the possibility that things might fail to come to fruition. In order to make a successful emergence more likely, art platforms bring together human-technical creativity, repetition, aesthetic amplification, folklore, and humour to generate a cultural organisational mechanism powerful enough to disrupt some of the domineering and stratifying tendencies of digital media, culture and society. They are self-unfolding mechanisms through which cultural life may advance to produce fascinating aesthetic objects and processes. If art platforms seem a kind of displacement of the organisational forces of a previous era, this is because they are an array of forces with which to explore and map the characteristics of the organisation of a new type of cultural emergence.

How do art platforms, as a contemporary marginal avant-garde-like 'genre', relate to the participatory social platforms (aka Web 2.0) that have gained enormous popularity in the recent years? It would be just as misleading to radically divorce the two as to not distinguish between them at all. The task is intricate. Both art platforms and the participatory web feed on the same machinery of creative energy. They build algorithms that attempt to allow them to act spontaneously, in order to take on the warmth of this creative energy's 'throbbing' engines, at the same time making the energy involved more structured or functional, more pleasurable, or accelerated and intense. Both art platforms and the participatory web deal with the human capacities, aesthetics, technology and societal structures that generate what is known as culture. Therefore, this article tends not to distinguish in a hard and fast way between culture at large and art. It is focused on the grey, anomalous zones in which one becomes another and vice versa. Indeed my interest is driven precisely by these processes of conversion. It is through their different allowances for these moments that the participatory web and art platforms may differ from each other, both empirically and conceptually, as particular technical settings and ecologies whose metabolism produces diverging energies.

In general, participatory platforms are not always geared towards creating conditions that might allow for such an aesthetic amplification to occur, or transform itself and become something else. The logic of their operations can often be performed in a more stable manner, pacifying relations between different social systems and functions. It is, however, perfectly possible to create art platforms inside, and as parts of, participatory platforms of different sorts. An art platform may indeed implant itself in the body of the participatory web. Given this parasitic phenomenon, any constellation of code, creativity, sociality, anger, excitement, repetition and amplification may, under certain conditions, become

an art platform.

The Differentiation of Networks

As a process of emergence, an art platform is then, firstly, an ongoing constellation of objects, codes, emails and the like, decisions, projects, databases, struggles, inspiration, explosive ideas, mundane work and conflict. An art platform is therefore a particular type of practice. Secondly, however, it is a type of network, a genre of network organisation. Thirdly, if the art platform is also a conceptual device, as described above, it is one that allows for a differentiation and problematisation of networks.

The concept of the network has a complex history and present configuration in the cultural sphere. More recently, and especially in the social sciences, and especially in the context of Latour's actor network theory (ANT), the network has been celebrated as a conceptual device that allowed for an acute analysis of the performance of transversal relations among actors of different types and orders that constitute the social as a certain kind of circulation rather than a fixed entity (Latour, 2006: 19). In ANT, the concept of the network was conceived as a means to address societal processes without withdrawing into a closed, cultured and mechanical universe of the traditional 'institution' and 'organisation'. Such an idea of the network has been at the core of the struggle against certain normative, essentialist and linear causality accounts of modernity. The concept has also carried with it the rhizomatic thought of Deleuze and Guattari. Rhizomatic thought is a conceptual practice introducing deformation, disequilibrium and asymmetry. It dissolves existing structures in order to compose different ones through non-linear processes of conjunction and change (Deleuze and Guattari, 2004). The network, in the light of the rhizomatic, was conceived in terms of difference, transformation and heterogeneity.

More generally, however, the concept of the network stems from network theory. This was developed by a branch of applied mathematics called graph theory that studies particular relationships between objects. With Leonard Euler's first proof of the theorem dealing with the Königsberg Bridge Problem in 1736, a concept of the graph as a mathematical object was formed. This consisted of discrete nodes (vertices) linked together by lines (edges), to be studied in terms of connectivity, disembodied from any other characteristic (Barabási, 2003). In the 1950s, sociology went on to borrow and adapt the conceptual apparatus of graph theory to apply it to the quantitative analysis of data. In doing so, sociology coupled the structural and the behavioural characteristics of networks (Newman et al., 2006: 6). Over the last decade, more or less, a radical update on these developments was undertaken. Using the name network theory, the update was most prominently popularised by the work *Linked* by Albert-László Barabási. Network theory aims to describe the general topological features of different kinds of networks including, but not limited to, biological, ecological, technical, social and communication networks. Network theory is a rapidly developing field, which no longer seems to be reproachable for its purely spatial approach (devoid of the dimension of time), or its level of general abstraction (the God's eye perspective) as it was previously. [2] Further developments in the field have urged the examination of the properties of particular, 'real-world' networks in empirical terms, and the recognition of the dynamic properties of networks that evolve over time. This included both the behaviour of nodes and the changing character of the links between them (Newman et al., 2006: 4-7). A typology of networks, accounting, for instance, for hierarchical structures, is a new direction, one pursued for its ability to address heterogeneous networks, as well as the heterogeneity of networks. [3]

Curiously enough, however, when it comes to networks, the social sciences form a terrain of imagination where the exact sciences meet the humanities in order to effectively misunderstand each other. Such ‘misunderstanding’ is based on sets of beliefs concerning how one strand of thinking and acting, which is quantitative and mathematics-based, can make use of another, which is qualitative and at its best a poetic act of hacking the process of formalisation, or vice versa. Throughout the twentieth century, a number of disciplines were formed to work on the translations between both sides. These included such disciplines as operations research, simulation or, to an extent, organisation theory. It is worth noticing that, throughout all of this, network theory is ultimately a quest to understand the systems whose underlying structures are networks (Newman et al., 2006: 415). In this endeavour, a kind of network theory ‘family photograph’ develops, with its step-grandmother in the second row, namely systems theory (with organisation theory on its lap). Here, the younger instantiations of network theory aspire to be a cybernetics of the twenty-first century. They wish to provide a mode of thinking based on the successful application of a number of abstract conceptual instruments to the analysis of diverse fields, in order to understand them at a sufficient degree of generality, while often subjecting what is thus analysed to the rigours of greater efficiency and control. Such sciences can acquire a dubious reputation—as mere pseudo-sciences. However, this does not stop them, at the same time, having an enormous impact on, and efficacy in the development of, practical applications within the like of military research, engineering, agent modelling systems, robotics and bio-technology, to name a few.

So far, I have discussed two concepts of the network. First, there was the network as an emergent ensemble, elusive and heterogeneous in its inclusivity of actors, and producing an ongoing resonance (as drawn from actor network theory). Second, there was the network as a topological distribution producing coefficients of connectivity (from network theory). Of course, these do not exhaust the means of thinking networks, of imagining them in both heterogeneous and non-linear ways, or of being able to differentiate between them. There are a growing number of other ways of developing concepts related to networks that have no need to be marked as the sole property of a specific discipline. These concepts can be unfolded as openly shared and enriched by the combinations of different disciplines, from the exact sciences to the humanities, biology and philosophy, as Gilles Deleuze both practiced and argued (Deleuze, 1995: 29). Such approaches have given us concepts of network production such as bifurcation (Prigogine, Deleuze and Guattari), networks as assemblages (DeLanda) and ecologies and media ecologies (Guattari, Bateson and Fuller), to name a few. It is in this context that we can discuss media ecology and networks.

Media ecology can be understood as a ‘green metallurgical concept’ that is both modest and mad (Fuller, 2005). Its modesty is found in its close and quiet attentiveness. Media ecology is submerged in the material, which we listen to while it is given space and the means to speak. Media ecology’s madness is found in its explosiveness. It is a way of working that not only wipes away traditional tools of understanding but also disassembles the world to the state of a cosmic soup, in order to further reflect on its phylogeny in action. Media ecology is formed by and often about networks. However, these are networks which are never found in equilibrium but are instead forever disassembling to become ‘something else’; networks that mutate into objects, resonances, pictures, people and organs. In fact, from a different perspective one could argue that networks have in the end nothing to do with media ecologies. The latter are rather ‘chemical constitutions’, involving processes of differentiation and amplification, for which networks, with their accumulated flavour of pernickety tracing, cannot account for or work with. At the least, when it comes to media ecologies, we can say that we are caught between the sometime abstraction of networks on the one hand, and material processes on the other.

To put this another way, media ecologies are processes of emergence of particular assemblages, which are discovered and participated in by following the activity of material processes. They are also conceptual devices that ques-

tion the evolving couplings of humans, animals, networks, machines, the like of blog posts and emails, air and 'ether', and art, in order to fight the claustrophobia of fixed structures. In addition, media ecologies are not especially preferential towards humans. Nor is much of the vitalist philosophy from which they partially derive.

What then, in this context, are art platforms? They do seem caught between the sometime abstraction of networks on the one hand, and material processes on the other. Are they particular types of networks? Seeing them as such allows us to talk about how they are constructed, how they operate, and what their actors, agencies, and publics are. What is it that gets produced by their circular exchange of energies? Or, are art platforms a particular type of media ecology, whose constituent components are to be isolated, described and analysed, as if by a taxidermist? Or should we talk instead of a media ecology of art platforms? We could discuss what human-technical processes emerge as art platforms, how they evolve, disassemble, change appearance, or set things off. This would be useful, as media ecology is first of all a relatively open way of looking and seeing, of doing and making. At the same time, this might sometimes conflict with the fact that an art platform is a rather unrecognised entity, an unplanned activity, an evolution that digresses. Perhaps we should start from the dynamics of the art platform. Ideally, an art platform is also a conceptual practice that is inclusive of a reflection upon its own media ecology (and its networks). A number of concepts might thus be used to address the phenomenon of the art platform from this complex set of perspectives. It is worth developing an approach that would allow for an art platform to manifest all its facets and particularities. This article now moves to equip the idea of an art platform with its own baggage—to enable it both to run free and to find something new to trip over.

Creativity

What is at the core of art platforms? Creativity and some form of sociality. What is at the heart of participatory, social platforms? Sociality and some form of creativity. In recent years the concept of creativity (and freedom as inseparable from it) has become highly charged, with a large amount of contradictory attention, very detailed description, financial investment, along with a distrust and hatred that it made it barely possible to discuss creativity at all in some contexts. The triumphant uses of the word, it seems, are those that turn creativity into a dull and sleek object, albeit with magic qualities. An object, because one can learn to manufacture it through specific training, sleek in its production of something new, beautiful and useful. Magic, as it turns out to have always been there and is able to instantly saturate life with satisfaction, freedom and happiness. However, this creativity is also dull because it involves a training system that aims to create a kind of creative fitness: in, short, cognitive capitalism.

In order to produce this creative fitness, psychology and other cognitive sciences research individual mental activity, build models of creative processes, and analyse creative individuals, creative products and creative environments. The focus is often on creativity as the production of something innovative and applicable to multiple contexts (Negus and Pickering, 2004; Csikszentmihalyi, 1996; Sternberg, 1999). Such studies are put to work in developing 'techniques of creativity' and in working out the organisational aspects that would allow for an increasing number of employers to discover and apply creative capacities for innovation (Nickerson, 1999). Creativity, although somehow deeply rooted in the production of the individual, is thus a function that is only perceived in terms of its successful realisation. It becomes something that can be refined by machinic processes to produce higher quality, dependable results. This flattening of aesthetic activity or 'desiring production' into a thin crust of the actualised severs creativity from its teeth, nails or any other sharp (and sometimes potentially vicious) body parts. Such creativity is devoid of

thickness, duration, or even folly. What is left in *residuo* is lobotomised optimism.

Another curious trick played on creativity involves its transubstantiation into the bodily quality of an elitist democracy. Creativity is seen here as, on the one hand, something every child is immersed in—as a state that embraces everyone creativity is inherently democratic. However, on the other hand, it often seems that few adults or events in human history are creative (Bohm, 2005). As a result, we find ourselves trying to account for the loops and holes in which creativity gets exhausted or lost on the way. The story goes that, when these are fixed, the *demos* will fatten the ranks of the creative elite (although this is something autonomists were anticipating as the end of capitalism). Those who are nauseated by this story point towards child labour, ecological collapse, increasing inequality or the reliance of such an elitist *demos* on the displacement of hard labour to those that are the more disadvantaged members of society, or simply elsewhere, from the Europe to Asia, for example (Holmes, 2008).

There are excellent critiques of neo-liberal, post-Keynesian ‘creativity’, in which areas of human life previously considered thoroughly personal, communal, or intimate are translated into the sphere/speak of economic transactions (Oudenampsen, 2007). The creative class, creative cities, and creative industries are all actualisations of new economic and political orders, which are simultaneously social formats. They are also mechanisms of subjectification, devised to stratify and commodify the ‘creative impetus’ immanent to both human and non-human forms of life. The expansion and mutation of modes of production involved is understood to devour all living energies, bringing them into measurable flows of capital. there are more than enough unknown or unpredictable factors or behaviours to influence the balance of complex systems. Yet nothing has been able to construct a mechanistic totality out of creativity, certainly not one explainable via a clear set of laws. Perhaps one unintended legacy of the attempt to regulate creativity will be poetic counter-visions, visions that not only respond negatively to the constriction of this regulation, but fit well with the apocalyptic ecological prospects that are the general darker side of contemporary capital.

At the same time, such critical approaches do not necessarily help give an account of creativity as such. We need perhaps a broader, more open, if messier, understanding of creativity, one that can account for all the different faces under which freedom/creativity is sensed and lived through—under various regimes. This would include, for the example, the creativity of Nietzsche and other philosophers, or those that speak loudest in the face of tyranny. Regarding the latter, we can consider two examples from the Soviet Union. Creating and memorising poetry became a means of survival in the Stalinist camp as did a kind of creative ‘inner emigration’ (a mental and spiritual, but not physical emigration) for many in the Soviet Union.

In the light of all the above, how then to rethink creativity? Perhaps it is better to think creativity as thick (like a fog or like flesh), chaotic, ‘dirty’ and conflicting, as a force of aesthetic desiring production that becomes both conceptual and subjective at a very late moment of its unfolding. Such creativity should not be mistaken for its realisations, its art-works or inventions. Such creativity is rather aesthetic in terms of the unfolding of sensation in desiring production. It is, crucially, self-organising. Indeed, in order to think creativity outside of the dominant, capturing, redundancies currently at work, I would like to suggest the concept of *autocreativity*. This is not to seriously claim the grandness of introducing an alternative ontology. However, autocreativity may come to be a lucky device—one that is both humorous and distancing. Autocreativity is a means beyond the determination of technics according to need and utility. It provides for the emergence of new conceptual tools, new ways of seeing and describing the present and its potential futures. Autocreativity is an autopoietic, autonomous, and automatic creativity. Unlike individual, human creativity, it propels aesthetic desiring production in the very constitution of the human, the cultural and the

social. It unleashes processes of subjectivation that are not solely locked into anthropomorphism but rather play out dynamically and recursively, in the different registers of the technical, natural and pre-individual. Autocreativity feeds the aesthetic operation that human-technical ensembles co-construct, while also being perturbed and effected anew by them.

The twist in the concept of autocreativity is in its double superfluity. First, it distinguishes between creativity as a functionalist category—an ontological quality put to work in the mines of the production of the new by creative capitalism—and a superfluous creativity that cannot allow itself to be so simply located, or categorised, even by itself. The latter certainly does not allow itself to become a training programme (so autocreativity as a term can be seen to be introducing a superfluity which undoes the reduction of creativity in functionalism). Second, autocreativity is actively opening to the superfluous in itself. Operating as machinic production, it is abundant and heterogenic. As a force of becoming rather than being, it moves and operates, beginning from the pre-subjective (not the 'creative individual'), through many layers brought together in events of creativity. These include networked media ensembles, but in autocreativity these share the condition of superfluity with the sun's energy, biodiversity, madness and desire.

Guattari uses creativity to think the root of every differentiation, of the fields of work and of thought, of their in-betweens and, necessarily, of art (Guattari, 1995: 91). However, art is made and operated by forces that are not always so eager to keep themselves open in relation to the fearless exploration of creativity. On the other hand, aesthetic production thriving on (auto)creativity does not necessarily result simply in the generation of art. Autocreativity has the energy to cross thresholds, to effectuate a change, and to divorce itself from the plane of any current stratum. This does not mean, however, that autocreativity has the structural functionality to execute a great (and finished) work of art. It is rather something 'pre', something making the world up. Autocreativity transcends diverse states and horizons as something to be joined in with, discovered, followed and worked with in order to become. Autocreativity is a machinic creativity that is not smoothly talked to; it does not operate in terms of either mundanity or newness. It is self-organising because this is the way it processes itself, the way it advances. But as it advances, it can also take on, or harbour, forms that are other than autopoietic.

Autocreativity as action is impossible to localise or subjectify. So the potential of autocreativity is not simply located on the biological level. It exceeds the potential of labour-power in so far as this is inseparable from a living body. It also exceeds this potential as it acquires the status of a commodity (Virno, 2004: 84). It is also found distributed within technical systems, objects, human beings, the fields of culture and of society. Unclean, outside in all weathers and stained with the mucus of different births, autocreativity also, of course, traverses digital networks. In digital networks, it is a dynamic process occurring in the relationship between network systems, software features, events, cultures, objects and human beings. The concept of autocreativity does not individuate creativity and lock it into humans. Nor does it locate it solely in inorganic systems. Autocreativity allows us to think creativity as a process of becoming in-between the human, technical and the social, and to investigate the roles performed within creativity by the resulting ensembles. As such, the pre-individual quality of autocreativity does not lock out the possibility of talking about the subjective and the social, and its technical dimension does not make it deterministic (Simondon, 1980). Thinking in terms of autocreativity, we can move across registers and scales to enquire into the unfolding of aesthetics, and only with this unfolding to account for different actors or roles being performed. In short, *autocreativity is a tool to think aesthetic genesis in its changes in state and position*. Autocreativity becomes a vehicle to move through and with technicity, subjectification, society and the production of art or non-art. The concept allows for sliding between the pre- and the meta-, the scales of micro and macro, hardware and software, art and folklore.

Autocreativity can yield a series of explosions through a particular combination of forces; *art platforms work as its catalysts*. Through art platforms a traversal of the common, the agreed, and the domestic is not only induced but also enunciated publicly—and perhaps cooperatively performed. Art platforms work autocreativity through mechanisms that are not defined or assigned with any stability, but develop themselves to contaminate the environment, to produce moments of differentiation that can become a kind of general aesthetic brilliance. As autocreativity is about becoming, it can allow for various human-technical ensembles in which people and things can become something they do not expect, or even want, understand or require. Here, to paraphrase Lacan on love, such assemblages create something they do not possess and give it to someone who does not need it. [4] Autocreativity can thus be as catastrophic as love in its creation of spaces that are alien, or dramatic in their un-decidability. In amplifying the alien, or the ambiguous, autocreativity expands into or creates extra spaces, other worlds, or other kinds of beings. In all this, the construction of value is enabled without operating according to any prior logic. Autocreativity lays out a few, or many, spaces of possibility without offering them up for immediate co-option. It is a process that establishes a possibility of something else, of heterogeneity, of the outside, where the self-organised dynamics of the unfolding of additional realities is the basis for freedom.

This certainly does not mean that every user is creative and autonomous or every creative act or project is ‘free’. Neither is the above meant as an anthem to art platforms. As mentioned, autocreativity cannot be pinpointed and located in human beings, objects, projects or machines. Rather it is evident in their inter-relationships. Autocreativity is dynamic, as are art platforms that continuously invent and remake themselves, although the continuity involved has nothing to do with speed or a fast-turnaround. The relation of the art platform to autocreativity is one example, if an important one, of how autocreativity is prone to relationships with other kinds of organisation. In coming together with autocreativity, these themselves become aesthetic processes (for example, organisational aesthetics as introduced below). Any kind of ‘digital aesthetics’ can be seen in this light.

Yet how is it that something is simultaneously a self-organising entity and an assemblage? How are we to understand the ‘auto’ in autocreativity?

Self-Organisation

The concept of self-organisation has a kind of poetic richness. Deleuze and Guattari, among others, have shaped this into a tool with which to think the morphogenesis of stable structures, and of singularities (Deleuze and Guattari, 2004; DeLanda, 1997). Guattari in particular suggests that when human beings join in the constitution of machinic assemblages with technical machines, institutions, and fields of the possible, they may form autopoietic ensembles (Guattari, 1995: 35, 40). Yet self-organisation has long faced a conceptual problem. This involves the fact, as put forward by Maturana and Varela (1972), that autopoiesis can seem to have no neat input/output system at its core. [5] This would be a system that would traditionally function to define an entity itself, and its relation to other entities or processes, even as it separates this self from these other entities or processes. Guattari solves this problem. In his work a different autopoiesis appears, one based on disequilibrium and complementarity in relation to the exterior. Such *autopoiesis operates with/in relations of alterity*. Machinic assemblages, while produced in relation to other structures, other components and other machines, are not locked into these entities. Machinic assemblages produce their consistencies in singularities that cannot be articulated through any unifying grammar that would allow for a neat input/output system. Thus, via alterity, autopoiesis is ‘collective’. In fact, autopoiesis operates with, and across,

infinite forms of machinic alterity: the alterity of proximity, of material consistency, of formal consistency, of scale, of agonistic alterity and the infinite variations of these alterities (Guattari, 1995: 45).

Guattarian autopoiesis differentiates eco-systemically (concerning functions in relation to other machines and elements), phylogenetically (concerning positions in relation to future machinic mutations). It creates a zone of 'self-belonging' ('machine/Universe coupling', some actuality rather than pure virtuality). Yet at the same time it provides a threshold to cross for other machinic assemblages, one plane, one scale among others. In this way, autopoiesis becomes an interface for *ongoing* 'embodiment', upon which a richness of various systems of value (rather than the dominant, capitalist value system) depends for its continuous existence in complexity. Birth as a process in-between 'the necessary actual' and 'the possibilist virtual' is an obvious and important example of the autopoietic (Guattari, 1995: 50-56).

With the ability to provide an account of the means of continued existence in the face of changing complexity, self-organisation has sometimes come to replace some of the prior conceptual tools of the revolutionary production of subjectivity, such as cooperation and mutual aid. Although these can be seen as earlier attempts at something similar, based as they are on cybernetic feedback mechanisms, or collective self-rule and self-government that, conceptually, are a few centuries older. Autopoiesis as discussed above promises the possibility of renewal through complete dissolution, and across different kinds of event (whether in relation to DNA, ecology, weather or individual variation). As in the example of a butterfly self-assembling from a soup produced by a caterpillar, concepts and practices of self-organisation are able to access and articulate change, alternation and assembly, and this on a much deeper level than any radical ideas of management—of at least the kind detailed above in relation to cognitive capitalism.

Such concepts have had a kind of pre-existence. For example, the metaphor that *The Internationale* anthem is built on is the destruction of the old world through demolition. Yet as a political device this is a somewhat architectural and industrial figure, one that seeks the clear destruction of old worlds, and the completion of a new world in its entirety, a world of better, perhaps more balanced structures. In that self-organisation arises from chemistry, physics and biology, and looks at, for example, cells, neurons, proteins, or thermodynamic systems, it concerns events and systems that are far from equilibrium. There is a sense in which all self-organisation is embryogenetic and as such it includes aspects of uncertainty, along with the ongoing 'miracle' of the becoming of something. While emerging in relation to certain codes, this becoming still cannot be entirely circumscribed.

Crucially, unlike the worlds of either cognitive capitalism or perhaps *The Internationale*, self-organisation as discussed here is not about a degree of external control, relationships of input and output, or costs. It is about how autocreativity operates and builds itself, how media ecologies emerge to become networks that are specific to themselves, and perhaps distant from each other, if in relation to their common process of production. Also unlike the worlds of either cognitive capitalism or perhaps *The Internationale*, self-organisation cannot be forced to occur. It is a process of embryogenesis, of ticklish layers that can affect the process at any moment. There is a risk, for example, of it becoming something that while never completely predictable can still be suspiciously mundane—it does not always achieve its promise.

Autocreativity is not enough. Or, to put this differently, it can be nudged from within its own ongoing constitution. A

variety of elements may couple with (or within) the process of self-organisation to launch chains of reaction that become part of the process. Self-organisation does not go unaided. Such aid can take many forms, from 'tools' fused into codes, to memes, or social fits of hysterics. It is here that I have positioned the art platform. However, there are certainly also other technical objects and processes that engage with the self-organisation of autocreativity.

Again, we can consider the rise of the social web, in which new social tools are seen as generating sufficient momentum to allow for certain hitherto indistinct or unrealisable forces to reach the surface and offer themselves to be immediately employed as something longed for as interpreted in Clay Shirky's good popular account, *Here Comes Everybody* (Shirky, 2008). Such social tools are formed in the couplings between networks, repetitions, protocols, mobile telephones, software, platforms, software functions, laptops, software cultural habits, and a general amplification. In the case of much social media, this all co-constitutes self-organisation *more self-evidently* than before (thus perhaps locking it down, or at least trying to, for example, onto a platform such as Facebook). Yet self-organisation also describes the means by which autocreativity works through art platforms to achieve a moment of aesthetic brilliance, of singularity or differentiation. What interests me in art platforms and the self-organisation of autocreativity is not this nascent becoming through return found in general social media, but processes of self-intensification to the point of brilliance, of the differentiations art platforms can produce.

Art platforms work with self-organisation, producing a means by which an aesthetic machinic current organises itself. In fact one could say that if the platform is not traversed by currents of self-organisation occurring at different levels, from the interaction of contributors to the generation of cultural forms, the art platform remains a hollow framework. Since their becoming relies on a combination of factors, art platforms are saturated with elements of self-organisation, or triggers towards it, that appear not exactly randomly but in a way that cannot be exactly planned. Art platforms further their existence if they happen to enter into relationships with elements of self-organisation and develop through these energies. But these elements or processes stream from the self-organising flow of autocreativity. They are not just applied as instruments in the service of the art platform.

An art platform is not only this flow of autocreativity. An art platform is always, of course, in some ways also devised, negotiated and redefined. It short-circuits itself as it traverses the energies it works with, in the process however becoming contaminated by these energies and their short-circuiting, and inventing its own form of self-organisation. It would therefore be more precise to say that art platforms work with the different kinds of organisation that autocreativity may sustain itself on, the "higher" level of self-organisation included. As such, art platforms do operate with a certain organisational aesthetics. In the case of platforms such as those linked to at the beginning of this article, this organisational aesthetics steers self-organisation and autocreativity toward an aesthetic becoming that has become known as digital aesthetics.

Conclusion: Organisational Aesthetics and Art Platforms

The case of art platforms allows us to understand organisational aesthetics both as a practical process of working within emergence and as a mode of enquiry. Both sides of this allow for a different way of understanding how phenomena such as a digital 'object' or process or (increasingly digital-influenced) body construct or operate

themselves. Organisational aesthetics delve into the changing manner in which the various strata of existence involved are actualised, along with the move towards these strata's assimilation within aesthetic registers (that is, the organisation of sensation or signification). Of course, aesthetic registers such as those of sensuality or signification form planes that intersect with other planes inhabited by social, economic and political forces. Yet the process is as exciting as it is grim. It opens new horizons of the possible, even sometimes while enhancing stratification and capture to unforeseen levels.

Through all this, organisational aesthetics conceptualises aesthetics as a register of becoming, a flow of production, a sphere of experience and a mode of engagement. Such an aesthetics does not directly relate to the sensual apparatuses as we know them, or to art as we know it. Rather, it is about differentials in action. This involves a kind of contemplation which stages a passage, via routes of diversion, a peering through, collapse, despair, humour, pain, flight, dream, trial, contrivance and experiment. The expansion or evolution that results within this contemplation endures throughout the process of structuration that attempt to fix the events involved, retaining at least some of their fluctuating intensity. Such an understanding of aesthetics in some ways resonates more with what Deleuze and Guattari describe as a desiring-machine (rather than with an apparatus in Jacques Rancière's terms, one of 'making sensible'). [6]

So, thus equipped, art and aesthetics are directly plugged into the electric waves of life. For Nietzsche, nature itself has an 'art-state', in which there are: 'artistic energies which burst forth from nature herself, without the mediation of the human artist – energies in which nature's art impulses are satisfied in the most immediate and direct way ... as intoxicated reality...' (Nietzsche, 1995: 17-19). Such intoxication is an abundance of 'life-force' that overflows into creative advance. Such an abundant generation of intoxication is the ontogenetic quality that I am looking for. From such a perspective, all aesthetics is a machine generating material variants of reality to enable knowledges, practices and perceptions to constitute and affirm themselves. In this it partakes in the overflowing of creative elaboration and surges with the energy and growing pains of coming into being.

Art draws both from this source and from historically acknowledged and institutionalised forms of creativity as this becomes tangible, socially acceptable, limited to cultured society. The central problem of contemporary aesthetics, and certainly aesthetics of those involving the digital and networks, is the recognition of the multiplicity of other forms and currents involved. I have here presented autocreativity as a response to this, as the lifeblood of networks as well as other objects and processes that stem from and define the topology, architectures, densities of amplification and equilibriums of creative emergence today.

I have also suggested that the organisational aesthetics of art platforms involve a practice and speculation on the forces that structure and channel their emergence and in the process enable them to make themselves available for varied practices, uses and logics. Art platforms exhibit a capacity to become eventful, to reach a threshold that amplifies the material inhabiting them into force of brilliance, enabling a transition into a different reality. In such a context, organisational aesthetics is not primarily occupied with previous institutions destabilised by network logic, or restructured and rearranged as leaking organisations. It is true that art platforms often mimic certain aspects of the structuring genealogy of organisations, partly due to their partaking in the sphere of organisations and networks dominated by forces and interests of particular kinds. It is also true that art platforms have to fight against, or learn to subtly deploy, the reflections and projections of such forces. It is also true that as these forces enter and leave art platforms, they may leave behind traces that contaminate and recompose the logics being actualised within an

art platform's specific organisational aesthetics. Yet all this is why, in the end, the organisational aesthetics of art platforms primary activity concerns generating its own effects in the field of power. Art platforms may even play a role in the field of power's ongoing constitution. They may generate effects within diverse vectors of valourisation, allowing for the composition of different objects, forces and relationships.

Organisational aesthetics starts by looking in two directions. On the one side, it looks into the bare, the chaotic and the turbulent plateau of emergences. On the other, it traces how these get pictured and mapped, restricted, capitalised and exploited, but also how they revolutionise the structured, the possible and the different. This account of the organisational aesthetics of art platforms concentrates on an experienced yet relatively unseen, everyday but relatively unknown reality. An organisational aesthetics of art platforms allows us to notice processes of creativity that are often lost in discussions of a general creative ability, whether seen from the point of view of neoliberal creative industries policies of cognitive capitalism or from that of a totalising Marxist critique of the latter. Instead, via an organisational aesthetics, and a consideration of art platforms of networked and digital media, we can focus on what forces are brought to us with the profound turmoil of the new types of networks. We can understand how human-technical ensembles pass through cycles of becoming, and differentiate between the specificities of these cycles. We can describe what the experience and generation of cultural forms involves. In the process, we will be able to enhance the ruptures this ongoing generation is able to produce and co-create moments that make us more alive.

Notes

[1] This argument is further developed in a forthcoming book, Goriunova, Olga. *Art Platforms and Cultural Production on the Internet*, (Routledge, 2011).

[2] Eugene Thacker's criticism of the concept of network stemming from network theory as essentially a Eulerian-Kantian enterprise seems to be overcome by the most recent developments in network theory (Thacker, 2004). See also Newman et al. 2006.

[3] Whilst the World Wide Web is found to be a hierarchical network, on the level of sites joined into larger modules, the router level Internet network is devoid of such hierarchical characteristics. See: Réka Albert, Hawoong Jeong and Albert-László Barabási, 'Diameter of the world-wide web', *Nature*, vol. 401, November, 1999 (130-131), reprinted in Newman et al., 2006.

[4] Rosi Braidotti uses Lacan's formulation of love in this way (Braidotti, 2003).

[5] According to Maturana and Varela, a living system produces and reproduces itself as a unity of components that in turn reproduce the processes of their own production and generate the living system through the realisation of a network of production (Maturana and Varela, 1972). Autopoiesis is a framework with quite a strict structure. An

autopoietic system possesses a topological unity. It produces its constitutive relations through the production of the components that act these relations out, and as an autonomous unity, it is closed, meaning there is no import or export of components, relations or structures. In the fields of physics, chemistry, and certain areas of biology, self-organisation is seen as a process of acquisition of structure both in living and non-living systems through relations internal to the system (See Camarine et al., 2003; Kauffman, 1993). The disparity between demands set by the precision of the term in the exact sciences and the adaptations it needs to undergo to fit thinking culture is what everyone who starts thinking societal and cultural self-organisation seriously has to consider.

[6] In his contribution to the philosophy of art, Rancière reflects on the political function of the aesthetic spectrum. This spectrum is composed of ways of 'doing and making', their 'forms of visibility' and ways of thinking about their corresponding articulation. Here, forms of visibility (the distribution of the sensible) define the range of possibilities and modes of doing in a particular setting, a setting which may itself be an artwork, and it is precisely at this point that aesthetic practice becomes political engagement. If traditionally aesthetics is a function of perception, then the first thing to question is certainly the subject of perception. Is it human, animal or technical? What is it that constitutes a percept and how does it carry itself? See Rancière, 2007: 10.

Biographical Note

Olga Goriunova is Senior Lecturer in Media Practice in London Metropolitan University. She has edited four volumes on software art and cultures related to the Runme.org repository and ReadMe Festivals. She is working on a book *Art Platforms and Cultural Production on the Internet* (Routledge, 2011), on an exhibition project *Fun with Software* on display in the UK (Arnlfini, autumn 2010), the Netherlands (MU, winter 2010/2011) and Germany (HMKV, spring 2011) and is editing a related publication.

References

- Albert, Réka, Hawoong Jeong and Albert-László Barabási. 'Diameter of the world-wide web', *Nature*, vol. 401, November, 1999: 130-131.
- Barabási, Albert-László. *Linked: How Everything Is Connected to Everything Else and What It Means*. London, Cambridge, Mass: Plume, 2003.
- Bohm, David. *On Creativity*. London: Routledge, 2005.
- Braidotti, Rosi. 'Rosi Braidotti en Matthew Fuller, met Stefan Decostere', *Cargoweb forum*, 2003, <http://www.cargoweb.org/forum/viewtopic.php?t=128>
- Camarine, Scott, Jean-Louis Deneubourg et al. (eds.) *Self-organisation in Biological Systems*, Princeton: Princeton University Press, 2003.

- Csikszentmihalyi, Mihaly. *Creativity: Flow and the Psychology of Discovery and Invention*, New York: Harper Collins, 1996.
- DeLanda, Manuel. *A Thousand Years of Nonlinear History*, New York: Zone Books, 1997.
- Deleuze, Gilles. *Negotiations*, 1972-1990, New York: Columbia University Press, 1995.
- Deleuze, Gilles and Félix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia Vol.2*, trans. Brian Masumi, New York: Continuum, 2004.
- Fuller, Matthew. *Media Ecologies. Materialist Energies in Art and Technoculture*, Cambridge, Mass.: MIT Press, 2005.
- Guattari, Félix. *Chaosmosis. An Ethico-Aesthetic Paradigm*, Sydney: Power Publications, 1995.
- Holmes, Brian. Email. Subject: Year Zero Amsterdam Creative City, (06.03.2008), to Nettime mailing list, <http://www.nettime.org/Lists-Archives/nettime-l-0803/msg00009.html>
- Kauffman, Stuart A. *The Origins of Order. Self-organisation and Selection in Evolution*, Oxford: Oxford University Press, 1993.
- Latour, Bruno. 'On Recalling ANT', in Law, John and Hassard, John, Eds. *Actor Network Theory and After*, Oxford, Blackwell Publishing, 2006.
- Maturana, Humberto R. and Francisco J. Varela, *Autopoiesis and Cognition. The Realisation of the Living*, Dordrecht: D. Reidal Publishing Company, 1972.
- Negus, Keith and Pickering, Michael. *Creativity, Communication, and Cultural Value*, London: Sage, 2004.
- Newman, Mark, Albert-László Barabási, Duncan J. Watts, (Eds.). *The Structure and Dynamics of Networks*, Princeton: Princeton University Press, 2006.
- Nickerson, Raymond. 'Enhancing Creativity' in Sternberg, 1999.
- Nietzsche, Friedrich. *The Birth of Tragedy*, Mineola, New York: Dover Publications, 1995.
- Oudenampsen, Merijn. 'Back to the Future of the Creative City: An Archeological Approach to Amsterdam's Creative Development' in: Geert Lovink and Ned Rossiter eds., *MyCreativity Reader. A Critique of Creative Industries*. Amsterdam: Institute of Network Cultures, 2007.
- Rancière, Jacques. *The Politics of Aesthetics*, New York, Continuum: 2007.
- Shirky, Clay. *Here Comes Everybody: The Power of Organizing without Organizations*, London: Penguin, 2008.
- Simondon, Gilbert. 'On the Mode of Existence of Technical Objects', trans. Ninian Mellamphy (London: University of Western Ontario, 1980 [1958]); <http://accursedshare.blogspot.com/2007/11/gilbert-simondon-on-mode-of-existence.html>
- Sternberg, Robert. (Ed.). *Handbook of Creativity*, Cambridge: Cambridge University Press, 1999.
- Thacker, Eugene. 'Networks, Swarms, Multitudes', *CTheory*, (2004). <http://www.ctheory.net/articles.aspx?id=422>



The LOCKSS System has the permission to collect, preserve and serve this open access Archival Unit



The Fibreculture Journal is published under a Creative Commons, By Attribution-Non Commercial-No Derivative licence.



OPEN HUMANITIES PRESS

The Fibreculture Journal is an Open Humanities Press Journal.



FCJ-116 Media Ecologies and Imaginary Media: Transversal Expansions, Contractions, and Foldings

Jussi Parikka
Anglia Ruskin University

Just as capacities of thought, of being, are made in lived bodies, in complex and delicately conjoined tissues and processes, and just as powers are inherent in all matter, materialism also requires that the capacities of activity, thought, sensation, and affect possible to each composition whether organic or not are shaped by what it is, what it connects to, and the dimensions of relationality around it. (Fuller, 2005: 174)

Now more than ever, nature cannot be separated from culture; in order to comprehend the interactions between ecosystems, the mechanosphere and the social and individual Universes of reference, we must learn to think 'transversally.' (Guattari, 2000:43).

In addition to the realisation that theory should be seen as situated practice, we can also consider practice as theory. Practices are in themselves theoretical excavations into the world of 'things', objects of (cultural) research conducted in a manner that makes the two inseparable. Practices probe, investigate, track, interrupt, intervene and question. Practices point towards the primacy of the experiment as a formation inseparable from theory. Practices are theories in the very dynamic mode that makes 'theories work.' As Karen Barad notes, 'as a result, method, measurement, description, interpretation, epistemology and ontology are not separable considerations' (2007: 121). What we know and how we know about it cannot be separated into non communicating spheres.

Practical projects such as Harwood, Wright and Yokokoji's Eco Media (Cross Talk) have developed new modes of thinking media (ecology) through a tracking of the intensities of the medium itself. However, in this case the medium is understood in a very broad sense to take in the ecosystem as a communication network of atmospheric flows, tides, reproductive hormones, scent markers, migrations or geological distributions. It allows tides and parasites as much as bodily fluids and the nose to become media (See Harwood, Wright and Yokokoji, 2008). The project(s) do not focus solely on the ecological crisis that has been a topic of media representations for years, but they seem to engage with a more immanent level of media ecology in a manner that resembles Matthew Fuller's (2008) call for 'Art for Animals.' Media is approached from the viewpoint of the animal and the perceptions, motilities and energies

(they mention for example wind) that escape the frameworks of human media. In this context I find their rhetorical question concerning non-human media intriguing: ‘Can “natural media” with its different agencies and sensorium [sic] help to rethink human media, revealing opportunities for action or areas of mutual interest?’[1]

Despite their eye on the age-old media of nature, such a project is emblematic of concerns that stem from a high-tech network culture. Non-human media of an eco-mediatic kind share with high tech protocols and technologies a processuality and heterogeneous mixture of bodies.[2] What this article addresses is the project of media ecology as a practice of theory and the topological continuity from nature to media. Through practical probings, the project exposes a different take on media that renegotiates the cultural underpinnings of media theory and expands it towards regimes of perception, motility and circulation of non-human speeds and spatialities. In other words, I want to expand on the notion of medium through taking into account such ecological underpinnings that can be seen as prisms through which to understand non-human energies. Some of the scholarly work on biodigitality has already suggested the notion of biomediality as a very fundamental recontextualisation of the biological with the technological (Thacker, 2004: 5-6), where biomediality refers to the various passages between regimes of the biological body and technologies of new media such as software algorithms and databases. For writers such as Georges Canguilhem (1994: 317, quoted in Mackenzie, 2002: 195), biological life as a process of heredity has always preceded the human media technologies of engraving, writing and printing by its own methods of transmission of messages, implying life itself as a process of mediation of kinds. However, I will focus less on such contexts of the biodigital or biological heredity and more on other regimes where the ecological and even biological is recontextualised as pertinent to considerations in media studies. As we will see below, this also extends to ideas related to media archaeology where the connection is most clearly made through Garnet Hertz’s Dead Media project that extends Bruce Sterling’s original dead media idea into even more emphasised politico-ecological contexts.

Contract/Transduct

What are media? How do you recognise something as a medium? We could think of media studies as a discipline that not only produces media professionals but teaches us what media is. Usually it is a noun—this is the safer way to introduce media in undergrad curriculums and when trying to make sense of the digital economy, for example; media are the entities that you find in media studies checklists as print, cinema, TV, radio and new media which itself boasts a long list of media forms from network media to mobile media.

An alternative would be to approach media in the active sense of doing—something that mediates; a turn from considerations of what is technology to what is technical. This is something that media studies does not always achieve and other fields of knowledge are as useful in teaching us such processual passages. Adopting an idea from Bruno Latour (2002), we can in this manner think of media in terms of action. Media are an action of folding time, space and agencies; media are not the substance, or the form through which mediated actions take place but an environment of relations in which time, space and agency emerge. This is also an idea that we find in Deleuze and Guattari’s (1994) emphasis on art as the creation of ‘a new space-time’, or to an extent part of Whitehead’s process ontology in which ‘[a]ctual entities, then, are not primordially located in space and ordered by time. Rather, spatial location and temporal sequence are themselves generated through the becoming of these actual entities’ (Shaviro, 2009: 61).

In other words, if we take seriously such ontological premises, media are also less a matter of mediation and communication between humans, than a milieu of engagement, or relationality for the objects, vectors, agencies and processes that enter into its sphere. It is a 'pulse of emotion' as Whitehead calls it, 'both a fresh creation of spacetime and an immediate perishing [...]' (Shaviro, 2009: 61.). Such an understanding of media as an ecology seems to be at the heart of Matthew Fuller's conceptualisation of the topic, and his expansion of media studies into the processes, forces and the weird materialities of technological objects. Media are contractions of forces and through forces bodies are born. Rather than just being solids, such bodies are processes and defined by their internal and external milieus in which they resonate (Fuller 2005: 71). Borrowing from ideas clearly related to both Simondon and Whitehead, Fuller is able to convey an approach to media that sees them in terms of energetics and materiality. Media function as an ecology in the sense that they are formed through circulations of energies, functions and so on, as well as the fact that they redistribute the forces that are not only technological in their existence but also aesthetic, economic and chemical. (Fuller, 2005: 56). In this sense, while media are themselves formed of 'synthesis and layering' (Fuller, 2005: 171), they also feed further possibilities of contracting forces.

As a method, such an approach to media technologies shows its usefulness in the context of contemporary digital culture. Already Simondon suggested that we can decipher genealogies of objects which show how they have been formed through evolutionary layering, the placing and displacing of functionalities and that this applies not only to organisms but also to mechanical machines. Simondon's displacement of hylomorphism has informed the more contemporary work of Latour, Deleuze, Guattari and in relation to media ecology, Fuller. Despite their internal differences, all these writers build on the foundation of Simondon's thought. For example, Simondon is crucial in this context for having insisted both that it is not only the human being but the machine as well that carries within itself dynamics of thought (1989: 58); and that the technical object is always accompanied by its associated milieu. Such ideas have been put directly into contact with media theory by Mackenzie who argues that Simondon's notion of transduction articulates together (I would add in an ecological manner) 'human collectives and non-human forces' (2002: 205). Technologies are always already about articulations of the living and the non-living in their ensemble (or assemblage) nature. Mackenzie's way of showing the interdependencies of the practices of technicity underlines this processuality, which stems from the collective nature of the bodies and individuations involved. Bodies are collective right down to their intensive formation but also in their relationality, where they form through individuation from (and back to) milieu relations. Such relations are always topological in their essence: continuously folding milieus, insides and outsides, a line that ties together natures and technologies.

The idea of media as a contraction and folding of time and space underlines the insight that time and space are not just solid and stable backgrounds for action or communication. They are themselves in continuous movement and mutation and are attached to the relations in which they are formed. Nature and media are subsequently to be understood not as distinct ontological regimes but both are to be seen in terms of processuality and becoming in the manner that the recent Deleuzian wave of theory has suggested. This can also be understood through Whitehead's ontology of event/pulsation as well as Simondon's concept of individuation. This ontological becoming is furthermore conceptually connected to the intensive, inexhaustible milieus which ontogenetically afford individuation. According to Simondon (Ibid: 58), the associated milieu is a field of potentiality that affords the mutational qualities of an individual whether human, animal or technological. Potentiality, the realm of the virtual, is a futurity that is enveloped in the present.

The notion of milieu is here crucial. It enables a different approach to that of the notion of environment considered only as a Newtonian, stable background; milieus are dynamic potentialities, becomings. For Simondon, individuation hap-

pens only through the milieu in which the formation of the individual is always via the baggage that it carries along with itself – this also applies ‘after’ individuation. Jean Yves-Chateau notes this active sense of the milieu for Simondon – which is in fact not far removed from the ideas of the early 20th Century ethologist Jacob von Uexküll except that it now also applies to technologies. Von Uexküll himself already developed the notion of ethological relationality that was later continued in wider ontological contexts by Deleuze and Guattari and some writers have suggested that von Uexküll could already be contextualised in terms of a wider machinology that subsequently moves beyond nature-culture distinctions (Ansell-Pearson, 1999: 188; cf. Parikka, 2010: 57-93).

For both von Uexküll and especially for Simondon, the milieu is not only external to the individual but also an associated and internal milieu through which the individual is born. Neither is it an objective in the sense of disinterested environment, or geographical place, but a lived milieu. (Chateau, 2008: 67-70). Milieus do not stay at a distance, but entangle with bodies. This is the reason why Simondon is of special interest to further considerations of ‘technologies of lived abstraction’ especially from a radically non-human perspective of technological individuation [3]. Such ideas of the milieu are applicable not only to nature but also media ecologies – and furthermore not only to humans, but to subjectivities of various kinds. Media ecological methodologies and excavations are in a good position to map such subjectivities that do not follow the normal definitions of subjectivities based in consciousness, morals, or for example human sociality, but in a more radical material relationality and sociability.

Eco Media as Cross Talk

What such a milieu perspective allows us to do is to approach media technologies as much more than their determined, intended or standardised uses. It provides an understanding of the inexhaustible potentialities of such assemblages. Matthew Fuller approaches art in this vein as an opening up of standard objects:

If a standard object is understood to have a specific set of qualities and affordances in one context, one set of dimensions of relationality, how can we use this constrained understanding of its capacities in another? Media are experimented on, not simply in terms of their affordances as standards, but also in terms of what may be mobilized or released when they come into odd conjunction with another scale, dimension of relationality, or drive. (Fuller, 2005: 172)

This furthermore questions the whole status of the ‘medium’ and for Harwood, Wright and Yokokoji points towards the scale of the material in media ecologies that cannot be neglected:

‘Medium’ is approved in art vocabularies. ‘Material’ is rejected. Mediums in art shed their materiality by absorbing, and thereby conveying, the artist’s mental, moral, spiritual, imaginary, and intellectual transmissions. When ecology joins art, materiality sheds its banal connotation and asserts its place beside the elevating role of medium. (2008: 14)

In this sense, setting up relations across scales (such as media extending towards nature) can be seen at the core of such an understanding of art as creating new material dimensions of relationality. Instead of seeing it as metaphors of bringing together two incompatible series through a linguistic act, it is a topological transduction of forces, where the art process is a catalyst of potentials. It is in this sense that I want to approach the Eco media project through its potential for 'cross talk.' Art and media ecology as cross talk remind us of the non-human roots of both art and media, and hence extend the work of experimentality as an exposition of potentialities to what we have usually thought of as 'solids' – nature. Cross talking is therefore a topological method in art.

The Eco Media project is introduced as a certain system of contraction of potential forces of nature. It can be seen as a laboratory for experimentation but one that does not rely on creating restricted spaces for animals or natural processes, but instead tries to tap into their functioning in the wild. In their research report Harwood, Wright and Yokokoji write how: 'By teasing out the nascent media already operating as transmissions of chemicals and energies – atmospheric flows, reproductive hormones, scent markers or geological distributions – we plan to find [sic] ways to integrate "natural media" with human media as "eco media" ' (2008:1). Recognising how this possibly could have been applied to a large amount of work done in the natural, life and environmental sciences, the project focused more closely on specific field studies. Can the human being become a bloodhound as the experiments with stereo olfactory devices and proper training suggest (drawing on an idea by scientists at University of California Berkeley)? Can software successfully 'record, generate and layer' bird calls to create places of exploration for non-human communication (a project by tEnt [Tanaka Hiroya + Cuhara Macoto] titled CALL <-> RESPONSE [2007] that the Eco Media refers to)? How does the human body extend itself into a machinic receiver through 'Eco-Ears,' 'a pair of head mounted domes which function like a stereo ear trumpet [...] based on a design from the First World War when they were used to listen



Figure 1: Eco-Ears from the Eco Media field day 27/9/2008, Southend-on-Sea. Image from the project final report. Published with permission.

out for approaching aircraft or artillery' (Harwood, Wright and Yokokoji, 2008: 7)?

The methodological point of the project is introduced as creating 'points of "cross talk" ' that are relays through which to establish communication between human and non-human media. This is done through experiments that themselves consolidate the already existing potentials between such realms, in which the modes of perception might have certain points of commensurability and the projects are in a crucial position in order to match such points and make them resonate. It reterritorialises ecological processes as media technological (cf. Thacker, 2004: 81).

As a practical experiment, the Eco Media project also taps into the ways we have imagined media and media theory since their beginnings. Here I am referring to the modern conceptualisations of what media are and where they stem from—roots that are more or less branded by anthropocentrism. Such key 20th Century claims as Marshall McLuhan's that every media is an extension of already existing human faculties can easily be tracked back to the 19th Century enthusiasm for the anthropological origins of media culture.[4] However, it would remain insufficient to just point towards this theme of non-human or post-human media; instead, as noted above, the Eco Media project wants to 'explore to the extent to which "animal media", its agencies and its sensorium can rethink human media, especially with respect to the organic origins of media' (Harwood, Wright and Yokokoji, 2008: 1). [5]

The crucial singularity in their project lies with the methodology of cross-talking that despite the somewhat human-centred idea of 'talking' aims to establish connections across various regimes of enunciation and expression: processes usually too fast or slow, loud or silent, big or small for human perception. As they frame it, in terms of practical experiments, one of the crucial questions is that of scale: 'many natural processes are beyond human scales of perception, too long or too quick' (Harwood, Wright, Yokokoji, 2008: 17). What the project aimed to establish was the realisation of a whole new media sphere that 'passes through' humans without us consciously realising it. The milieu here becomes much more than an environment of natural processes; it becomes as they argue a media network and hence reveals the modalities of expression that can be translated into human media:

This project would try to find processes in the natural world ('natural technics') that could function as carriers of signals or messages. Because these processes would be in the form of materials or forces that were common to the habitats of animals, this held the prospect of these messages being accessible to the non-human realms – hence the title of 'Cross Talk'. (1)

The project itself is more interesting as the establishment of a field of its own rather than any one particular project that was realised under it. It included the mapping of earlier projects and related contexts, field studies on the human organism with references to Georges Bataille and the media historical experiments of Alexander Graham Bell, as well as the Eco-media Open Day held at Southend-on-Sea, Saturday 27 September, 2008. The Open Day could be seen as a community oriented exercise in 'archaic media' that were set against very different modes and even scales of communication media. This was most evident in The Great Internet vs. Pigeons Race that set the carrier pigeons of the Leigh pigeon club the apparently impossible task of racing against the Internet to deliver packets of information (Fig 2). Funnily enough, the pigeons won due to a failed internet connection. Natural media Olympics tested the affordances of shouting, whistling and lobbing, for example, as effective modes of using the body and its vocal and motile skills as media

I want to point out how we can understand Cross Talk as a focus on lived relationality, or the primacy of relations; a perspective that is also useful for a wider consideration of media ecologies. Fuller establishes this point about relationality when he argues for the potentiality of art to make new scales sensible. This can be seen as a political invention of scales and relations – Fuller (2005: 132) mentions the general strike and internationalism as such events of rescaling and relations- and we could easily extend the idea to media ecological considerations as does Fuller: 'A dimension of relationality, the combinatorial arrangement of such relations, can further be said to provide a means toward describing, actuating, or multiplying the powers of an element within a composition' (Fuller, 2005: 131). Relationality here becomes not only an ontological fact of assemblages (that relations are external to the components they connect and hence have a dynamism and reality of their own (DeLanda, 2006: 10-11)), but also a tool for excavating the arrangements of relations. In short, if you want to understand an arrangement, such as a media technological assemblage, look at its relations and compositions.



Figure 2: "The Great Internet vs. Pigeons Race" that was inspired by David Waitzman's RFC 1149 Standard which used the principles of the Internet Protocol but in the context of pigeons as information carriers. Published with permission.

In this sense, media ecological objects are also processes and 'compositional dynamics' as Fuller argues referring to Whitehead (2005: 131). Objects are far from inert 'things' but instead consist of various dimensions of relationality. Relationality is here less a matter of communicating content than a weaving in and out of scales and incorporating them into its assemblage (See Fuller, 2005: 132). The Cross Talk mode of communication is in this sense communication as a topological weaving of various scales of perception, motility and sensation into a joint assemblage in which human media are able to touch animal and natural media.

Methodologically the project outlines the themes of how such transversal communication across scales can be also brought to bear on recent ecological contexts. The project does less a work of analysis than the invention of these points of proximity for 'new catalytic nuclei capable of bifurcating existence' (Guattari, 1995: 18). Furthermore, it is a testing ground for what they call 'species-centric assumptions' concerning media such as security, privacy and the public, and for how such notions can be tested through new transpositions. (Harwood, Wright, Yokokoji, 2008: 16). Indeed, they also mention how this idea extends their previous work with free media that involves projects of community inclusion and experimentation with open formats and free technological infrastructures. [6] Through methods that range from the documentation of the stages of the project, its practical methods and the key questions raised within it, and by means of correspondence as well as public presentations, the project worked to bring such fields

as ecology, biosemiotics, zoosemiotics, socio-biology as well as ethology in touch with concerns that are relevant both for the technological assemblages of contemporary media and also for the aforementioned political economy of media (Ibid., 17). Aesthetics turns into politics and the relations of perception and modes of organisation extend into a reconsideration of how we might think human media as well.

Through such mediation, media ecology refers to taking natural ecologies not only as the object of research but also as a mode of understanding the ontological processuality of the world. Furthermore, the ecological perspective can be seen as a tool for creating transversal connections between regimes of enunciation and action (Genosko, 2009: 67-68). It points towards the over- and inter-lapping of the biosphere with the mechanosphere to use Deleuze-Guattarian vocabulary (Genosko, 2009: 83-84). Since the 1990s, partly inspired by the McLuhanesque underpinnings of media as environments of perception, the new immersive digital environments spurred the discourse of networks as environments (see Morse, 1996: 203) and as a third environment of sorts that enables the appropriation of value in a similar manner to the way that capitalism had turned 'first' nature into a standing in reserve for exploitation (see Wark 1994). In addition to such ideas, it is the biological that has increasingly been negotiated through technological assemblages. This can be seen as a biopolitical appropriation of the creative forces of nature (See Parikka, 2008; 2010) as well as the increasing informational intensification of natural milieus with such technologies as Radio Frequency Identification Tags (RFIDs) (van Kranenburg, 2008). In both examples, it is more a case of new entanglements of bodies of heterogeneous kinds than the mere indication of the metaphors of immersive natures online.

Cross Talking in this sense is a mode of transversal connectionism. For Guattari, the notion of transversal communication emerged from the innovative practices at the La Borde institute, where the relations between patients and staff was reshuffled on a continuous basis, consolidating such new transversal connections that cut across hierarchical and horizontal power relations. Genosko has suggested the notion's usefulness for a wider politico-ontological methodology that should be taken into account in the context of transdisciplinary knowledge. This means establishing 'new connections between science-society-ethics-aesthetics-politics' (Genosko, 2002: 200), which reshuffle the roles of such institutions or regimes of enunciation by bringing them into new proximities.[7]

If Cross-Talking is about transversal communication between the biosphere and the mechanosphere, where nature and artifice blend into each other on a plane of immanence that affords communication and creation beyond 'fidelity to relations of species and genus' (Ansell Pearson, 1999: 161), then such experimental projects as Eco Media can be seen as the creation of a sort of Universe. Such platforms of experimentation draw on contemporary media cultural concerns such as those associated with free media. However, these practices are recycled via nature and so the messy entanglements of nature and culture are acknowledged. In this sense, eco art does not mean simply an art that engages (solely) with natural ecology, but one that involves existential territories of subjectification that are based not on closed models but on practices that are inclusive, creative and that track the precarious singularities of the assemblages involved (Guattari, 2000: 51-52). The Eco Media project tracks and maps such singularities of nature but also catalyses them through considerations relevant to contemporary media culture.

Various recent art projects extend ecology not as a theme of naturalisation but quite the opposite: with an eye on the continuous individuation of forces considered natural. [8] What is curious about the Eco Media project in this sense is that its task of expanding modes of expression transversally reaches out towards media history as well and hence involves what I would call a media archaeological dimension. In other words, its specific form of *imaginary media* not only maps past media ideas that never existed, but also a creative imaginary of media outside the human realm.

The next section will focus on this idea. It will also discuss another related project that can be seen as both media archaeological and media ecological in its orientation before arriving at some conclusions.

Media Ecology as Imaginary Media

The notion of imaginary media has acted as one of the important revitalisations of the discourse of media studies of recent years. Scholars such as Eric Kluitenberg (2006) have worked to promote the intellectual and practical possibilities of thinking media outside of its current actualised examples and to include a variety of discourses and phenomena under the much broader umbrella of media studies in the imaginary mode. Imaginary media is related in this sense to media archaeology, a common ground for both being a special focus on the past as a resource for rethinking and regrounding the way we approach modes of perception, sensation, and the creation of media. In the hands of writers such as Siegfried Zielinski (2006), the idea of a *longue durée* of media culture turns also into a qualitative rethinking of temporality that draws much more from paleontological ideas à la Stephen Jay Gould than a linear understanding of history in the 19th Century mode. Evolution turns out to be less about master plans and progress, than about a multiplicity of variations. This notion of temporality as based on variations and percolations instead of arrows or cycles (see Serres and Latour, 1995: 58-59) has implications for the way we approach the ontology of technology as well. Moving away from an anthropomorphic-McLuhanite perspective, Zielinski suggests that we should reconsider the deep time ontology of technology as ‘deeply inhuman’ (2006: 6). [9]

The inhumanity at the heart of the media archaeology of technology also extends towards media ecological contexts. The Eco Media project also contextualises itself as part of a much wider media archaeological lineage, with specific nods towards earlier precursors that have used natural bodies as vehicles for communication. However, both this project and Garnet Hertz’s Dead Media project that will be introduced as a parallel enterprise of relevance to media ecology, produce quite a refined understanding of what imaginary media are. They both highlight that the topological continuity of media ecological projects not only weaves together nature and media technology, but also introduces the imagined into potentiality and potentiality into the actual.

As a ‘change in focus’, the Eco Media project proposed to look at such things as bodily fluids or bodies as conduits for communication, from spit to Alexander Graham Bell’s 19th Century experiments of using human bodies to transmit phone calls (Harwood, Wright, Yokokoji, 2008: 3). This was not conceptualised as a straightforward historical excavation but as a return to ‘experimental historical forms’ (Ibid: 8) and practical exercises such as using archived recordings of cod breeding from 1971 (National Sound Archives) and replaying the sounds to ‘young codlings as they entered the Thames Estuary’ (Ibid: 7). The performance piece by Graham Harwood and Matthew Fuller extended the usability of archives in a slightly similar way to the sound artist Mira Calix’s use of archived insect noises from the Museum d’Histoire Naturelle in Geneva. [10] For the Harwood-Fuller experiment, the context was different, however, and the piece which was performed as part of the Eco Media field day in 2008, extended the transmission of archive material to an audience of non-humans.



Figure 3: Eco Media Day poster (27/9/2008). Published with permission.

The project's final report includes an appendix that works as a dip into the field of media history revealing the multiplicity of bodies of communication: from pigeons to magnetism, from horses to using phenomena such as light for communication and media, from the bodies of monks wired up by Jean-Antoine Nollet in 1746 to a variety of materials like woodcuts and selenium (as used by Paul Nipkow in 1884 for his early TV systems). Indeed, the history of media can be seen as a work of probing the qualities of materials in order to find out what different bodies can do; what are their qualitative affordances in terms of the communication with and contraction of the world; how can matter circulate energy and meaning?

Does this suggest the idea of media history as a history of affordances? Could we look at media technologies as active furnishings of 'what-ever-can-be-done' in terms of seeing, hearing, moving and relating, for example? In this sense, the notion of media archaeology expands beyond human media and the contexts of the Eco Media project, which extend transversally not only toward nature but also towards history, become understandable. As flagged above, similar projects of interfacing and transversal communication have been proposed by others as well. I want to pay special attention here to Garnet Hertz's Dead Media initiative (2009) that deals with very similar issues at the crossroads of media archaeology and ecology. It borrows the name from Bruce Sterling's classic excavations, begun in the 1990s, into the zombies of media history--the dead that refuse to go away, as well as Sterling's attempt to create an indexical archive for such dead technologies. In the context of the growing eco crisis, Hertz updates dead media research, according it a much stronger ecosophical interest.

Under the umbrella agenda of 'how to creatively repurpose and reuse electronic waste', media ecology becomes an active mode of trying to come up with new uses for dead media and media archaeological ways of tapping into the ecological crisis. Hertz's project (<http://www.conceptlab.com/deadmedia/>) is about the active contextualisation of creation through three fields of interest;

1) 'Repurposing' as a creative and artistic methodology that re-uses the 'leftovers' of the information technology boom and addresses the problems of electronic waste (chlorinated solvents, brominated flame retardants, PVC, heavy

metals, plastics and gases). I would also see this as the creation of a new temporality in terms of detaching the cycle of consumption from the short-spanned individualised human time of 'use-worthy' technologies and extending it towards non-human dimensions.

2) In terms of extending beyond individualised use, the project also addresses 'community and artistic production' as the context for dead media. Through DIY methodologies and circuit bending, a whole new realm of understanding and extension of the use of media technologies is opened. With some similar ideas to Mediashed's free media projects that Eco Media also continued, this stream of Dead Media interest is seen by Hertz as the creation of new communities forming around the opening up of archaic technologies.

3) The third area of interest makes the connection to media archaeological themes clearest. 'Innovation through analysis of media history' points towards an active reframing of the temporalities of media evolution. Instead of a linear conception of past media understood as bypassed presents, time is implicitly understood in such a media archaeological context as a continuous relocation and reallocation of potentialities. Time is not a flow from the past to the future via succeeding presents but a continuous shifting of emphases, which in this case means tapping into past media as a reservoir for the sustainability of a future. According to Hertz, this points towards the usefulness of obsolescence: 'In other words, the history of technological obsolescence is cheap R&D that offers fascinating seeds of development for those willing to dig through it. This lab encourages the study of obsolescence and reuse in media history as a foundation for understanding the dynamics of media change' (<http://www.conceptlab.com/deadmedia/>).

Both these projects are at the conceptual and practical crossroads of media ecologies and media archaeology. They summon an imagination of media that is not only imaginary in the Lacanian sense of projecting an imaginary unity and hopes onto media technologies, or in the sense of looking for media that did not actually exist. Imaginary media becomes a creative exercise in the same manner that any *preservation* of nature can become an active creation that does not have to rely on ideas of the originality of nature as a substance. Nature is instead an affordance and a creative process: a *natura naturans* as it was for Spinoza. This we could understand in terms of the new materialist understanding of media in which modes of perception, affect and engagement with the phenomenological modalities of media experience are about very concrete, physical ways of modulating the human sensorium. But it can also be seen as a way of transversally connecting beyond categorical differences between nature and culture, technology and nature etc.

As well as pointing towards Spinoza, the notions of a non-bifurcated nature and a creative organism can be connected to the revitalisation of Whitehead's ideas in cultural theory (Thrift, 2008: 228). Whitehead's process philosophical ideas are also useful in rethinking biology as something that is 'able to innovate, to produce original answers to changing conditions' (Ibid.). In addition to Whitehead, we could point towards the just as important revitalisation of Darwin for cultural and media theory (Grosz, 2008), as well as the growing interest in accounts that bypass the hylomorphic schemes of Western metaphysics (Simondon, 2007; Parisi, 2004).

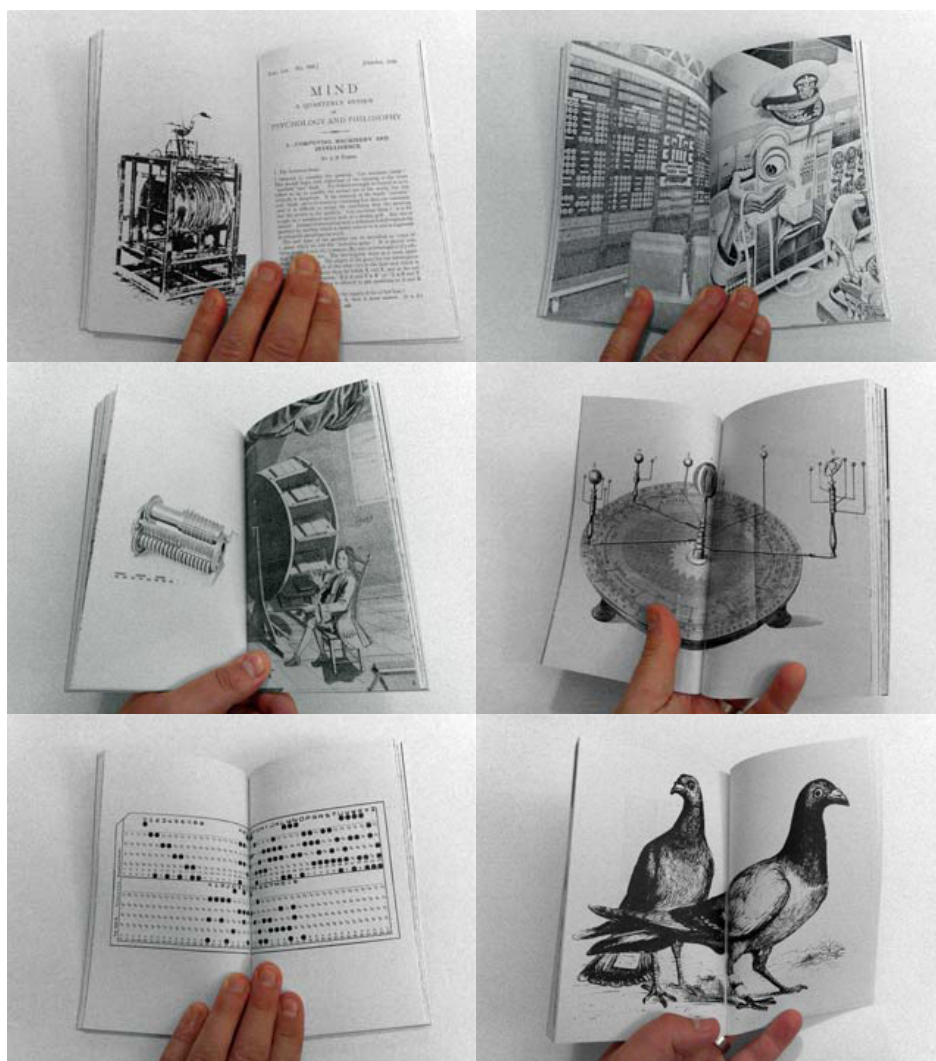


Figure 4: A collage of images from Garnet Hertz's *A Collection of Many Problems* booklet (2010), which can be seen as a book of *problematics* – of tapping into the reservoir of media history for inspiration not as perspectival distancing but as an active engagement with how to do things with a variety of bodies/materials at hand: <http://www.conceptlab.com/problems/>. The booklet includes the list of image sources. Published with the permission of Garnet Hertz.

Media become in such projects less a human endeavour of mediating messages than a mode of contracting forces to create new space-times. Such space-times are as much about the 'natural' (modes of perception, physiology, contracting natural phenomena) as they are about the 'cultural' (artifices). Or more accurately, they reveal the artifice at the core of the supposedly natural in the sense of how composition and the event operate across any ontological bifurcations. Through projects such as *Eco Media*, divisions between nature and artifice become secondary and methodological approaches to tinkering with topological passages between such regimes are the driving force in creating transversal links. As noted, in the Guattarian understanding of transversality, such a method involves local connections in new regimes of proximity with neighbouring practices and discourses. In an age where through biodigital practices even such grounding agendas as what counts as life are under question, it is natural that the answers to 'what counts as media' are not easy. Indeed, what we find in *Eco Media* is not a list of technologies, but methodologies and questions with which to try out what *could* act as a medium; what flows, what carries, what

bends time and space. The same goes for Dead Media as Garnet Hertz understands it: its less a static check list of media, than, through lists and exercises, a mode of probing the ways in which zombie media can interrogate the fuzzy borders between living and obsolescent media; a question which in itself involves multiple ecologies from the political to the environmental, from social questions of usability to questions of the economics of capitalist media dedicated to producing death (through the short life-cycles of media and the closed media assemblages that are often increasingly harder to open up and circuit bend).

For Fuller (2005), one of the tasks of media ecologies is to carve out unaccounted for potentialities from standardised media objects. The examples of media ecology analysed above point towards such a potentiality but with a specific nod towards a creative reuse of history. At the same time, the use of history summons a new mode of temporality that is reminiscent of a media archaeological agenda; time becomes a rewiring of potentialities, not a stable archive of collected past presents. This supports wider reconsiderations of the place of nature in current technoculture where nature has been turned from an object of stability and stillness into a mode of becoming of heterogeneous bodies and relations, alongside an interest in the economic possibilities of the intensities of bodies (See Thrift, 2008: 56-74). The supposed 'stillness of nature' turns out to be a multiplicity teeming with potentials that are increasingly also the motor for the production of value for the capitalist exploitation of lived bodies. Media ecological projects have in this sense to be aware of the contexts of capitalism in which 'ecologies' are produced.

To conclude, I would like to wrap up some of the key features of media ecology as read here especially through the Eco Media-project and the Dead Media project. Media ecology involves an expansion of media to include a number of processes, objects and modes of perception, motility and relationality that are not usually seen as media in its modern, cultural sense; in this expanded mode, media becomes an ethological relationality rather than merely a technological object. Hence, media ecologies can take its cue as much from flows and streams of nature or the modes of perception of animals as from conventional media technologies. Media ecology is topological.

Media ecologies engage in a transversal communication that ties together the aforementioned media of nature to considerations of current media culture. Media ecologies can bring such dispersed practices into proximity through experimental takes, methods, field days and the like that engage in rethinking human-centred notions of security and ownership, for example, that characterise the contemporary media sphere. With the Eco Media project, this is combined with an expansion of the notion of free media.

In our take, media ecologies act as a sort of imaginary media; not in the sense of media of imaginary things but imagination as the extension of the potentialities of media. Through the projects, we could get a glimpse on the idea of media history as a reservoir of R and D, as Garnet Hertz has labelled it in the wake of media archaeological research, which poses not only the demand to rethink temporality in a less linear way but also the political-economic ties of media in the midst of the current eco crisis.

Acknowledgements

A thank you to the anonymous referees for their feedback and to other peer-reviewers of drafts as well. A big thanks to Michael Goddard for his help in editing and to Garnet Hertz and the Mediashed/Eco Media team for the permission to use the images.

Biographical Note

Dr Jussi Parikka is Reader in Media Theory and History at Anglia Ruskin University, Cambridge (UK). He is also the Director of CoDE: the Cultures of the Digital Economy research institute. Parikka's most recent has focused on media archaeology and new materialism and recent publications include *Digital Contagions* (2007), *The Spam Book* (2009, with Tony D. Sampson), *Insect Media* (2010) and the forthcoming *Media Archaeologies* (2011, with Erkki Huhtamo). <http://www.jussiparikka.com>.

Endnotes

[1] CrossTalk, unpublished Summary Paper. Downloaded from: <http://mediashed.org/ecomediaday>

[2] This is evident for example in the experience of wirelessness, which can be approached through the meshwork of hotspots and relations, transitions and conjunctions that link lived, experiencing bodies (Mackenzie 2008).

[3] For more on "technologies of lived abstraction", see the Montréal based Senselab-series: <http://senselab.ca/events/technologies-of-lived-abstraction/>

[4] A key figure here is Ernst Kapp whose very similar theories to McLuhan's have remained the vague reference point for a variety of more recent theoretisations of what media are. To put it briefly, Ernst Kapp (1877: 21) introduced his famous theories of technology as an extension of the human species in 1877 in *Grundlinien einer Philosophie der Technik: Zur Entstehungsgeschichte der Cultur aus neuen Gesichtspunkten*. Ernst Kapp, *Grundlinien einer Philosophie der Technik: Zur Entstehungsgeschichte der Cultur aus neuen Gesichtspunkten*. In this early theoretical example influential on later cyborg media theories and ideas of organ projection, Kapp conceptualised technology as based on the human body. The human being is the measure of all things (*Der Mensch das Maass der Dinge*), a proposition that was meant as a continuation of the Kantian theme of perceptual worlds. (See also Parikka, 2010: 9-11, 76).

[5] As Simondon argues, this idea of nature and animals teaching humans arts and skills was already a Renaissance

theme (e.g. Giordano Bruno) (2004: 68).

[6] See their Mediashed Website at <http://mediashed.org/>. When finishing this final version of the article the Mediashed-server was down and waiting to be replaced.

[7] In studies of science and technology, perspectives that connect nature and culture (or technology) in a continuum have already been developed. I am here thinking of Luciana Parisi's highly original take on differentiation and sexual difference, which also draws on Guattari's notion of transversality and mixed semiotics. Parisi herself uses this to point out that the discursive and the material are in no instance disconnected and that semiotics is always mixed: it consists of both asemiotic encodings (such as processes of nature, flows, genetic material) as well as regimes of signification (Parisi, 2004: 71). Parisi points out in her text the usefulness of Simondon's notion of individuation for a mixed semiotics, or an assemblage-approach but I want to remain here with the ecological contexts – or more specifically eco-art.

[8] Naturally Eco Media is not the only project to do this kind of work of catalysing 'natural' bodies through technological contexts. Natalie Jeremijenko's ideas have produced similar passages of 'Cross-Talk.' OoZ (<http://www.nyu.edu/projects/xdesign/ooz/>) creates interfaces for human-animal interaction which are also aimed at deterritorialising human-centred political ideas in a similar fashion to Eco Media's Free Media underpinnings. It also taps into modes of animal communication exploring such interfaces through a technology that can bring such techniques into contact with the modes of perception humans occupy. We could see various entanglements of the human body with electronic media as similar creations of novel assemblages. It is a matter of revealing the body of the human itself as milieu of collectivities and a multiplicity of teeming potentialities; an invisible ecology. Guattari writes: '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.' (1995: 9) Ulrike Gabriel's digital art piece 'Breath' catalyzes breathing through sensors that map its speed, depth and regularity onto a externalised representation through an algorithm; this is however less a representation, than a more of individuation of the breathing that conjoins the milieu of electronic media, and brings forth a new body, a new milieu complex, a new assemblage of bodies in/through technology (cf. Shanken, 2009: 170). In terms of flows of a different ecological scale but perhaps pointing towards some similar themes as Eco Media, the Milk Project is an interesting mapping of international flows of food. It tracks the movement of milk from Latvia to the Netherlands using GPS technologies that are visualised. The movement of milk is informationalised, visualised and backed up with photographs and sound recordings of the people involved. This presents a different kind of flow that involves 'nature' but also various political, economic and technological networks that facilitate the movements. See <http://www.milkproject.net>

[9] 'The paradigm of technology as an organ was a crutch used in the development of mechanics; similarly, the organic becoming technology is now a poor prosthesis in the age of electronics and computation. Technology is not human; in a specific sense, it is deeply inhuman' (Zielinski, 2006: 6). In terms of Zielinski's position, this ontological statement does not resonate with his actual methodology that turns quickly in his Deep Time of Media into an excavation of past male geniuses and hence reintroduces a very human-centred position for media history.

[10] Mira Calix, 3 Commissions. Milkfactory site at <http://www.themilkfactory.co.uk/> .

References

Ansell Pearson, Keith. *Germinal Life. The Difference and Repetition of Deleuze*, London: Routledge, 1999.

Barad, Karen. *Meeting the Universe Halfway. Quantum Physics and the Entanglement of Matter and Meaning*, Durham & London: Duke University Press, 2007.

Canguilhem, Georges. 'The Concept of Life.' In *A Vital Rationalist: Selected Writings from Georges Canguilhem*, edited by Francois Delaporte, trans. Arthur Goldhammer, Zone Books: New York, 1994, 301-320.

Chateau, Jean-Yves. *Le vocabulaire de Simondon*, Paris: Ellipses, 2008.

Delanda, Manuel. *A New Philosophy of Society. Assemblage Theory and Social Complexity*, London and New York: Continuum 2006.

Deleuze, Gilles and Guattari, Félix. *What is Philosophy?* Trans. Graham Burchell and Hugh Tomlinson, London and New York: Verso, 1994.

Fuller, Matthew. *Media Ecologies. Materialist Energies in Art and Technoculture*, Cambridge, MA and London, England: The MIT Press, 2005.

Fuller, Matthew. 'Art for Animals', in Bernd Herzogenrath (ed.) *Deleuze/Guattari and Ecology*, Basingstoke: Palgrave 2008, 266-286

Genosko, Gary. Félix Guattari. An Aberrant Introduction, London and New York: Continuum, 2002.

Genosko, Gary. *Félix Guattari. A Critical Introduction*, London: Pluto Pres, 2009.

Guattari, Félix. *Chaosmosis. An Ethico-Aesthetic Paradigm*. Trans. Paul Bains and Julian Pefanis, Bloomington & Indianapolis: Indiana University Press, 1995.

Guattari, Félix. *The Three Ecologies*. Trans. Ian Pindar and Paul Sutton, London and New Brunswick, NJ: The Atholone Press, 2000.

Harwood, Wright, Yokokoji. 'Cross Talk: using the natural environment as "eco media" '-unpublished Summary Paper, March 2008.

Kapp, Ernst. *Grundlinien einer Philosophie der Technik: Zur Entstehungsgeschichte der Cultur aus neuen Gesichtspunkten*, Braunschweig: Druck und verlag von George Westermann, 1877.

Kluitenberg, Eric. (ed) *The Book of Imaginary Media*, Nal Publishers: Rotterdam, 2006.

Latour, Bruno. 'Morality and Technology. The End of the Means.' Trans. Couze Venn. *Theory, Culture & Society*, Vol. 19, No. 5-6, 247-260, 2002.

Mackenzie, Adrian. *Transductions. Bodies and Machines at Speed*, London: Continuum, 2002.

Mackenzie, Adrian. 'Wirelessness as Experience of Transition.' the *Fibreculture Journal*, issue 13 2008, http://.fibreculture.org/issue13/issue13_mackenzie.html

Morse, Margaret. 'Nature Morte: Landscape and Narrative in Virtual Environments', in Mary Ann Moser and Douglas MacLeod (eds) *Immersed in Technology: Art and Virtual Environments*, Cambridge, MA: The MIT Press, 1996.

Parikka, Jussi. 'Insect Technics: Intensities of Animal Bodies', in Bernd Herzogenrath (ed) *An [Un]Likely Alliance: Thinking Environment[s] with Deleuze/Guattari*, Newcastle: Cambridge Scholars Press, 2008, 339-362.

Parikka, Jussi. *Insect Media. An Archaeology of Animals and Technology*. Minneapolis: University of Minnesota Press, 2010.

Parisi, Luciana. 'For A Schizogenesis of Sexual Difference' *Identities. Journal for Politics, Gender and Culture*, vol. III, No.1, Summer 2004, 67-93.

Serres, Michel, with Bruno Latour. *Conversations on Science, Culture and Time*. Trans. Roxanne Lapidus, Ann Arbor: The University of Michigan Press, 1995.

Shavero, Steven. *Without Criteria. Kant, Whitehead, Deleuze and Aesthetics*, Cambridge, MA: The MIT Press, 2009.

Simondon, Gilbert. *Du mode d'existence des objets techniques*, Paris: Aubier, 1989.

Simondon, Gilbert. *Deux Leçons sur l'animal et l'homme*, Paris: Ellipses, 2004.

Simondon, Gilbert. *L'individuation psychique et collective*, Paris: Aubier, 2007.

Thacker, Eugene. *Biomedica*, Minneapolis and London: University of Minnesota Press, 2004.

Thrift, Nigel. *Non-Representational Theory: Space, Politics, Affect*. London: Routledge, 2008.

van Kranenburg, Rob. *The Internet of Things: A critique of ambient technology and the all-seing network of RFID*, Institute of Network Cultures Notebooks: Amsterdam, 2008.

Wark, McKenzie. 'Third Nature' *Cultural Studies* vol 8(1), 1994, 115-132.

Zielinski, Siegfried. *Deep Time of the Media: Toward an Archaeology of Seeing and Hearing by Technical Means*. Trans. Gloria Custance. Cambridge, MA: The MIT Press, 2006.



The LOCKSS System has the permission to collect, preserve and serve this open access Archival Unit



The Fibreculture Journal is published under a Creative Commons, By Attribution-Non Commercial-No Derivative licence.


OPEN HUMANITIES PRESS
The Fibreculture Journal is an Open Humanities Press Journal.



FCJ-117 Four Regimes of Entropy: For an Ecology of Genetics and Biomorphic Media Theory

Matteo Pasquinelli
Queen Mary University of London

Introduction

*Language is not life; it gives life orders.
Life does not speak; it listens and waits.*

— Gilles Deleuze and Felix Guattari *A Thousand Plateaus*. (1987: 76)

After the age of the *machinic*, the *bios* reenters the zeitgeist. Cybernetics and hacker culture in the 80s, the ‘network society’ in the 90s, the dot-com bubble around 2000 and the ‘long tail’ of the metadata of Web 2.0 marked the evolution of the *digital phylum*. In the last decade, a different conurbation of forces—climate change and energy crisis, ‘pop genetics’ and protests against GMOs, bioterrorism hysteria and bioethical crusades—started to sediment a new episteme concerned with the living. This affected the technological discourse too. If, according to Michel Foucault, modern biopolitics was about the management of populations and corporeal discipline, then since WWII a new interest has emerged around the microscopic scale of the bios—around the cell as the unit of life. Cultural mediators have been gathering in the interstice of this shift, developing the missing theoretical tissue between digital code and genetic code, between media art and a new controversial *bioart*.

Two main questions arise concerning this cultural shift. First: To what extent can biological models be employed to describe the mediascape as a new sort of ecosystem? To what extent, for example, can the metaphor of ‘media ecology’ be grounded in a properly biological paradigm? This question has relevance for political debate too, as *biomimetic* figures inspired by digital networks begin to be applied to new political concepts: see, for instance, the figure of the swarm applied to the postmodern notion of the *multitude* (Hardt and Negri, 2004, and also Parikka, 2008; Thacker, 2004). Conversely, a second question addresses the biological from the point of view of the digital. If ‘code’ is the universal semiotic form that is common to human language, computers and DNA, to what extent can cybernetic and digital models be applied to the biological? The history of *bioinformatics* started shortly after the

discovery of DNA in the 1950s, accommodating quite a strict reductionism between 'digital code' and 'genetic code.' What are the consequences of a computer-based understanding of cellular reproduction for the sphere of ecology and biodiversity?

Schematically, the question is how to apply the forms of the *bios* to the *techne*? And conversely, how to apply the forms of the *techne* to the *bios*? In answer to the first question this essay tests the homogeneity of the *biomimetic continuum*, which supposes the mediascape as an extension of the biological realm (like in the notion of the machinic formulated in Deleuze and Guattari, 1987). Responding to the second question, this essay analyses the *biodigital continuum*, which takes binary code as a universal grammar from the Turing Machine to DNA, and then reduces the *bios* to a computable *logos*. Or, as Kelly (2002) puts it in his logocentric manifesto 'God is the Machine': computation can describe all things, all things can compute, all computation is one. The general purpose of this essay is to clarify the notion of 'media ecology' from the perspective of these two continua which consciously or unconsciously trouble its definition.

Sliding along the different typologies of the continuum that cut across the physical, biological, technological and cognitive domains (*hyle*, *bios*, *techne*, *logos* in Greek archetypes), this essay starts by positing the cell as the unit of life as opposed to the code as the unit of life. Reversing the dominant paradigm of the 'genetic code' is considered a necessary move in opening the biopolitical field of the cell, to ground a visceral materialism and eventually to outline, a new 'ecology of biotechnologies.'

The first part of the article presents a basic 'bestiary of the invisible' to demonstrate paradigms of (microscopic) life which do not follow genetic logocentrism. Through authors such as Freud, Serres and Margulis, a new energetic diagram of the cell is advanced, calling for a general metabolics of organic life in opposition to the dominant partisan genetics. Trying to debunk the fatal opposition between code and energy, the second part of the article introduces DNA as an extension of the cellular body. Deleuze's notion of the fold is employed to recognise 'genetic code' as a folding of organic matter in on itself with no intervention of any external grammar. This incestuous relation between linguistics and genetics is traced back to Erwin Schrödinger's seminal book *What is Life?* precisely, Schrödinger's notion of negative entropy is finally taken up as a key concept to clarify the four different regimes of entropy that compose the physical, biological, technological, and cognitive domains.

Inspired by the post-structuralist paradigm of Deleuze and Guattari, this essay nevertheless advances a critique of their notion of the machinic continuum. Against the enthusiasm of new media scholars and activists, the mineral, organic, technological and informational domains cannot be so smoothly compared, translated and coupled with each other as they belong to different entropic regimes. Only the recognition of the frictions and accumulations of energy surpluses occurring between these different ontological strata will make possible the imagining of a new ecology of machines.

The Cell as the Unit of a New Biopolitics

Since its discovery, the cell has been an arena of diverse scientific and ethical interpretations of 'life' and has progressively become an agitated battlefield for religion, politics and business. In the 1950s the discovery of DNA shifted the focus to the very core of the cell nucleus and to the very abstract level of the genetic 'code.' Afterward the newfound layer of the 'code' merged quickly with the *digital phylum* and shifted the biopolitical debate towards sequencing computers, genome databases and ultimately new media art and culture.

During this evolution, the very 'flesh' of the cell was left behind by genetic reductionism and its cultural translations. Against the mechanistic and allegedly neutral paradigm of genetic code, in this essay the biopolitical field of the cell is enlarged, magnified in its metabolism and framed again as the unit of life. This approach may seem to go back to pre-DNA biology and in fact it underlines the importance of the cellular *Umwelt* and the need to develop a new micro-ecology. For instance, a congruous notion of genetic ecology or the ecology of biotechnologies is yet to come and the branch of microbial ecology is unable to evade its disciplinary realm. Outside of the *imperium* instituted by the DNA age and its intensive *bioethics*, the microscopic space of the cell still lacks a cartography of its extensive ecology.

The discovery of DNA opened a new dimension of knowledge, but proportionally also unveiled and expanded the ratio of the unknown. The human genome has been entirely mapped but the so-called 'junk DNA' (95% of all DNA) still has an unknown function. At a higher biological scale, the human body keeps on carrying its secrets. The human body is made of tens of trillions of cells and in the intestine 100 trillions of bacteria and friendly parasites live as a 'forgotten organ.' The scale of the unknown and everyday relations with micro-organisms should be the first argument to suggest an ecology of the invisible.

Missing an epistemological method to explore the invisible dimension of the *bios*, pre-scientific narratives may become useful again. Bestiaries were used in the Middle Ages to describe and classify ordinary, exotic and often imaginary animals. They were books of mythologies and superstitions but they kept open the dimension of wonder. Their rudimentary zoology and botany often incarnated and protected pagan beliefs against clerical normalisation. Today entering unexplored dimensions of the *bios*, a bestiary of the invisible, of the infinitely small, of genetics itself is advanced here to underline again the living, breathing behind the genetic code.

More precisely this 'bestiary of the invisible' focuses on unicellular organisms such as bacteria, yeasts and organelles as they constitute the raw subjects of biotechnologies and occupy the same scale as, for instance, cloned embryos and stem cells—that is, the scale of new biopolitical domains. Specifically, here the focus is on single-cell prokaryotic organisms, which do not possess a distinct nucleus containing chromosomes like superior *eukaryotic* organisms and reproduce in a more primitive, often asexual, way. This choice is justified in order to show an alternative microscopic organism (like *prokaryotes*) that skips the DNA-centric scheme of popular genetics (concentrating only on *eukaryotes*).

More importantly, instead of applying transcendental schemes to the *bios* (from Freudian psychoanalysis to Foucauldian biopolitics or mainstream biology itself), this bestiary starts from the cell as unit of life to follow its reproduction and multiplication from below without artificial external intervention. Taking the cell as the unit of life is considered a less ideological postulate than the notion of code when reading the history of thought up until contemporary media studies. A 'bestiary of the invisible' is necessary precisely to demonstrate how 'even the microbiological is ultimately a mirror of the human' (Roof, 2003: 343).

Protista: The Inorganic Continuum beyond Psychic Life

Sigmund Freud began his career by studying the nervous systems of crayfishes and sectioning hundreds of male eels looking for their penises at the Trieste zoological station. However, the foundations of psychoanalysis were influenced more by the hard science of physics than by 'softer' disciplines such as biology. The concept of psychodynamics (itself inspired by Gustav Fechner's psychophysics) was proposed by German physiologist Ernst Wilhelm von Brücke, Freud's supervisor at University of Vienna. Together with Hermann von Helmholtz (one of the formulators of the first law of thermodynamics), Brücke supposed that all living organisms were systems governed by the law of energy conservation (Brücke, 1874). If the human body follows the laws of physics, so does the mind: such a 'thermodynamic' psychology grounded psychic life on a conservative equilibrium of energy.

The 'hard physics' approach to the mind was however mitigated and modulated by the theories of evolution of the time. The perception of a continuum between the laws of *res extensa* (inorganic matter) and the laws of *res cogitans* (mind) found its conciliation in the realm of biology: the missing link between the inorganic and organic world was to be found within the cell and its evolution into a more complex organism. In fact, Freud took the recapitulation theory developed by the German biologist Ernst Heinrich Haeckel to expand his inorganic continuum at the level of the mind and, once again, applied the laws of inorganic matter to psychic life.

In his famous 'recapitulation theory' Haeckel stated that the embryonic development of an individual organism (its ontogeny) follows all the stages of the evolutionary history of its species (its phylogeny). If 'ontogeny recapitulates phylogeny', the stages of the human embryo have to recapitulate and resemble the stages of fish, amphibian, mammal, monkey, etc. (Haeckel, 1867, 1879). This *biomorphism* (similarity across different domains or species of the living) was quite primitive and deterministic but useful for reinforcing Freud's continuum and reversing Haeckel's vitalism in favour of the power of the inorganic matter over life. In his essay *Beyond the Pleasure Principle*, Freud defines the death drive of the unconscious as a manifestation of the 'desire' of the cell to go back to a previous stage of its evolution—that is, the stage of inorganic matter. Every cell of our organism is meant to carry this death-wish, this drive towards to the inorganic (*Thanatos*) together with its reproductive instinct (*Eros*):

It seems, then, that an instinct is an urge inherent in organic life to restore an earlier state of things which the living entity has been obliged to abandon under the pressure of external disturbing forces; that is, it is a kind of organic elasticity, or, to put it another way, the expression of the inertia inherent in organic life. [...] If we are to take it as a truth that knows no exception that everything living dies for internal reasons — becomes inorganic once again — then we shall be compelled to say that 'the aim of all life is death' and, looking backwards, that 'inanimate things existed before living ones.' (Freud,

1920:30)

Freud took the unicellular organism protista as a universal sign of the dualism between Eros and Thanatos. Probably he was also inspired by Haeckel's beautiful drawings of life forms published in *Kunstformen der Natur* between 1899 and 1904. Through those books, Freud probably fell in love with the protista and put them at the basis of his psychodynamics. As Roof brilliantly remarks:

For Sigmund Freud, the protist is an instrumental interspecies example of the wider truth of his psychodynamic formulations. Standing (or swimming) at the base of the complex ontogenetic/phylogenetic architecture of Freud's thought, the protist and its twin the "germ-plasm" are primal, deathless reference points for Freud's thinking about life processes. The protist is both tabula rasa and antediluvian archetype that proves the elemental antiquity and universality of the drives (death and pleasure) and instinct (sexuality) governing vital impulses. [...] At the same time, the protist is the anthropomorphized subject of a psychoanalysis as Freud interprets its impulses, demonstrating how even the microbiological is ultimately a mirror of the human. (Roof, 2003:343)

Yeast: Mythology and Ecology of the Parasite

Freud's diagram of the cell is still dialectical (Eros vs. Thanatos) and trapped in a familial *Mittel Europa* of closed curtains and the studio sofa. Whereas Freud split the unicellular organism between the inorganic death drive and the organic pleasure principle, French philosopher Michel Serres has proposed a synthesis in the asymmetrical figure of the parasite, which he elevated to a universal and anti-dialectical form of the *bios*.

Contrary to Freud, Serres addresses decay and death as components of life and his dystopian ecology includes the invisible fermentation and proliferation of all micro-organisms. Similar to Freud, Serres reverses pedestrian vitalism and describes nature and society as a chain of asymmetrical relations. Where vitalism puts the double arrow of cooperation, Serres unveils the third arrow of a parasitic exchange:

A human group is a simple relation of order, irreversible like the flow of the river. One feeds on another and gives nothing in return. [...] Man is a louse for other men. Thus man is a host for other men. The flow goes one way, never the other. I call this semiconduction, this valve, this single arrow, this relation without a reversal of direction, "parasitic". [...] We parasite each other and live among parasites. (Serres, 1982: 5-10)

Serres finds the parasitic relation at every scale of the living. Nature is but a never-ending chain of parasites eating each other down to the invisible ones: 'What does man give to the cow, to the tree, to the steer, who give him milk, warmth, shelter, work, and food? What does he give? Death.' And again: 'The fruit spoils, the milk sours, the wine

turns into vinegar, the vegetables rot, the stores of wheat are filled with rats and weevils. Everything ferments, everything rots. Everything changes.' After death microbes decompose our body and bring it back to nature: *putrefaction is life*. This unseen world of bacteria, fungi and yeasts is also part of our food chain: they breathe with us and eat with us too (in our intestinal tract). Serres places a parasite at the beginning of evolution too. Here Freud's protista are found again at the base of evolution, yet in the role of a parasite.

Irreversible living time begins with the introduction of a parasite. In the common vicinity of what is called inert and what is called living, a virus reproduces in a parasitic fashion. It is not uninteresting that it has been called a [bacterio]phage. Throughout classification and throughout evolution, the parasite is there, protozoan, metazoan, present as if to keep up the continuity of the course of life. (Serres, 1982:188)

Serres' biomorphism escapes the deterministic space of science and highlights the general economy of micro-organisms and their Umwelt. At another scale, his expanded biomorphism also recognizes a role for micro-parasites in the genealogy of Western mythologies and religions. The 'holy covenant' was metaphorically the alliance with the microscopic and the ever-proliferating world of yeasts in the form of fermented food and beverage. Fermentation techniques and domestication of the yeast indeed saved humankind from viruses and noxious bacteria. According to Serres, ambrosia (the first alcoholic drink of humankind made out of honey) became the 'nectar of the gods' and symbol of immortality since fermentation was also good for sanitising water and enriching it with nutrients. Similarly, yeast is seen as the divine agent that during the Last Supper guaranteed the miracle of turning water into wine and hence giving a 'new life' to humankind. Aside from the metaphysical figure of the parasite, here Serres, more prosaically, incarnates the alliance between man and microcosm into the common yeast of beer and bread *Saccharomyce cerevisiae*:

Ambrosia is found among the Hindus as much as it is here; it is the brew that saved the human population of the Fertile Crescent, and from even further East of Eden, from certain infectious diseases found in the lakes and backwaters. Beer, wine, and bread, foods of fermentation, of bubbling, foods of decay, appeared as safeguards against death. These were our first great victories over parasites, our rivals, obtained, as might be expected, for reasons and intentions that were completely different from those that made them triumph de facto. From the Olympians to the Last Supper, we have celebrated the victory to which we owe our life, the eternity of phylogenesis, and we celebrated it in its natural spot, the table.

Here the question discovers its model. I shall no longer die from eating bread; my son will no longer die from drinking the wine or the brew of the gods. The chain that was eating us has been abolished. Take this line literally: your ancestors drank water from Jacob's well, and they died. They died from it, as the water was no longer potable. Drink the water changed into wine and the wine changed into the brew of immortality; you will be free of parasites. Of mortal, deadly putrefaction. We must then pass from the model to the ecosystem. We are not different from the animals that were eating us, the small animals that were killing us. We eat ourselves; we kill each other. (Serres, 1982:183)

If Freud condemned the life of the cell into the death drive to the inorganic, Serres unveils the role that microbes

have behind the narratives and desires of humankind for immortality. Whereas Freud posited inert matter beyond the metabolism of pleasure, Serres finds the *bios* proliferating behind the *mythos*.

Mitochondrion: The Endosymbiotic Theory of Evolution

The endosymbiotic theory was first formulated by the Russian botanist Konstantin Mereschkowsky around 1905 and then expanded and rearticulated by Lynn Margulis (1970). After being dismissed by mainstream biology, the theory is today a part of the orthodoxy of evolutionary theory and very popular among scholars of *post-humanities*, as it assumes cooperation between microorganisms as an engine of evolution instead of Darwinian competition. As Margulis put it in a telling article: 'Life did not take over the globe by combat, but by networking (i.e., by cooperation)' (Margulis and Sagan, 2001: 11).

The endosymbiotic theory postulated that mitochondria and plastids, which are organelles of eukaryotic cells, were originally separated organisms. Mitochondria are the 'cellular power plants' generating most of the cell's energy supply (as adenosine triphosphate, or ATP) by burning oxygen. Chloroplasts capture light, conserve its energy into ATP and liberate oxygen (a process known as photosynthesis). Mitochondria developed from proteobacteria, chloroplasts from cyanobacteria. These proto-organelles were very simple organisms that happened to be ingested by bigger cells and never digested. Once inside, they developed an energetic symbiosis with the host cell and constituted a new life form.

Endosymbiosis occurs between organisms of very different scales too and even between humans and viruses. Examination of the results from the Human Genome Project brought some evidence for the endosymbiotic theory, as some portions of the human DNA have a bacterial or viral origin. This strongly supports the idea that symbiotic—and in fact *parasitic*—relationships are a driving force for evolution in all organisms. By bringing symbiosis within the cell itself, the hegemony of genetic code on evolution is undermined. New organisms are formed on the basis of conviviality—that is by sharing the same energy 'feast' (*convivium* in Latin)—and they exchange their genetic code only afterwards. The theory of endosymbiosis expands furthermore Serres' parasitic continuum. Usually symbiotic relations occur between organisms of the same scale, for example between animals or between microbes. Endosymbiosis points to a relation between different scales of the living and opens up the continuum of energetic exchanges from microcosm to macrocosm. Also the 'civilisation of the yeast' (as in 'civilisation of iron') and its techniques of fermentation are forms of *endosymbiosis* or *exosymbiosis* with microorganisms (which become an extension of the human digestive tract).

This simple bestiary of three microorganisms (protista, yeast, mitochondrion) and their expanded *Umwelten* (pleasure principle, yeast civilisation, endosymbiotic evolution) are meant to highlight the energetics driving the cell before any genetics. The dominant episteme of the (genetic) code fails precisely at describing the energetic ecosystem of the cell and at developing a consistent ecology for the microcosm. However, energy cannot be taken as a further idealistic or deterministic concept. Seen from the perspective of energy, the organic continuum appears as a landscape of many asperities: energy emerges as a web of irregular processes of condensation and accumulation. Symbiosis and parasitism are in fact not linear exchanges of energy but vortical movements of accumulation.

Georges Bataille defined life in relation to such a surplus of energy.

Neither growth nor reproduction would be possible if plants and animals did not normally dispose of an excess. The very principle of living matter requires that the chemical operations of life, which demand an expenditure of energy, be gainful, productive of surpluses. (Bataille, 1988: 27)

Bataille unveiled that energy is never a linear measure but implies always accumulation and excess. Whereas Margulis found an energetic parasitism within the cellular structure, Erwin Schrödinger will be introduced in the next section to highlight an asymmetrical surplus accumulation occurring similarly at the very chemical level of the cell.

Organic Chemistry and the Barrier of Cell Metabolism

The distinction between organic and inorganic compounds is quite a recent one. Ancient Greek culture was often referring to the doctrine of hylozoism, a more urbanised and intellectual variety of animism, for which all matter was considered a living and sentient being—whereas, on the contrary, modern scientific determinism ended up applying the laws of physics to all life, including psychic life (as seen in Freud). The primacy of the living in relation to the inanimate was gradually reversed over the centuries. If the Golem of Prague is the most recent incarnation of an ancient alchemic ambition to infuse clay with life, the first official invasion by the ‘hard’ sciences into the superior realm of the biological occurred with the laboratory synthesis of urea by Friedrich Wöhler in 1828. Today the genetic alchemist Craig Venter claims to have built a synthetic organism completely from scratch: *Mycoplasma laboratorium*. However, like any other genetically modified organism, his patented artificial bacterium will ‘depend for its ability to replicate itself and metabolise on the molecular machinery of the cell into which it has been injected, and in that sense it will not be a wholly synthetic life form’ (Pilkington, 2007).

Modern physics has rendered less and less rigid the separation between organic and inorganic forms. Nobel laureate Ilya Prigogine, for instance, found that phenomena of self-organisation and autocatalysis are not life-specific but belong to any matter in states far from equilibrium such as ultra-hot magma or ultra-cold gas (Prigogine, 1977; Prigogine and Stengers, 1984). Inspired by Prigogine, and Deleuze and Guattari’s famous chapter ‘The Geology of Morals’ in *A Thousand Plateaux*, Manuel Delanda has introduced a sort of ‘geological’ model into biology. His essay with its unequivocal title ‘Nonorganic Life’ gives philosophical coordinates to further secularise the origin of life, now towards inanimate matter and in the process to institute an inorganic continuum (DeLanda, 1992). In Delanda, as well as in Deleuze and Guattari, life appears as only one stratum of this inorganic continuum. Indeed, similarly to a geological stratification, ‘the strata are extremely mobile’, (Deleuze and Guattari 1987: 502), and there is no natural primacy of one over the other, of the organic over the inorganic domain, for instance: ‘If one begins by considering the strata in themselves, it cannot be said that one is less organized than another. [...] There is no fixed order’ (1987: 69). They recognise ‘inter-stratic’ exchanges but only in the form of ‘transcodings’ and ‘intermixings.’ This ‘geological’ model, developed by Deleuze and Guattari as a foundation of a new materialism, with its ideal continuity, fluidity and mobility of all the domains (mineral, biological, technological, semiotic) had an enormous influence on contemporary thought. It is reflected in their notion of the *machinic*, influenced Delanda’s notion of the living and also deeply affects the current understanding of biotechnologies and ‘media ecology.’

Nevertheless, despite scientific progress and the attempts at a conceptual harmonisation between physics and biology, a crucial organic barrier still remains intact: laboratory synthesis of the simplest aromatic ring of organic compounds is highly energy-expensive when not impracticable. Via photosynthesis, for instance, nature fixes and accumulates solar energy into the molecular bonds of sugars and carbohydrates, in this way initiating the food chain. Other organisms then feed on plants, plankton and algae, and parasite this energy supply. The structure of sugar molecules is quite simple but chemistry fails to imitate the virtuous metabolism behind them. The fixation of solar energy into carbon rings is indeed a challenge to the second law of thermodynamics as vegetable cells do accumulate energy against its spontaneous dissipation (Erwin Schrödinger considered this process the enigma of life metabolism and called it ‘negative entropy’). The industrial synthesis of complex molecules (from plastic and drugs to biofuel) still relies on aromatic rings, as found in nature, as primary ingredients, or by-products of yeast and bacterial fermentation.

Delanda’s seminal contribution is a description of self-organisation phenomena that pertain to *each* stratum of reality from mineral magmas and the food chain to the evolution of languages (i.e. the inorganic, organic, semiotic flows described in DeLanda, 1997). However, a model for energy accumulation and surplus asymmetries that occur across and between those strata is still missing. In the typically postmodern homogeneous space of contemporary thought, frictions, asymmetries and barriers of energy that occur between the inorganic, organic, technological and semiotic strata are not accounted for.

What modern physics and philosophy are keen to describe in the spectrum running between chaos and order are forms of dynamic equilibrium—but these nevertheless still remain primarily forms of equilibrium. Cell metabolism and its elegant, enigmatic and controlled energetic asymmetry still lack a status within much of these disciplines. Between the deterministic laws of physics and the combinatorial code of genetics, philosophy still has to contextualise a new metabolics—with a new discipline to conceptualise and measure the surplus and the accumulation of energy taking place across the biological domain and more importantly within the economy and society.

Schrödinger’s Cell: Code-script and Negative Entropy

In a prophetic text of the DNA age, Erwin Schrödinger’s *What is Life?*, the notions of genetic code and cell metabolism were still discussed together. In his book Schrödinger advanced the idea that a chromosome contained an ‘aperiodic crystal’ in the form of a ‘code-script’, inspiring later on the discovery of the double-helix shape of DNA. Still it is very rare that ‘popular geneticists’ and ‘theoreticians of life’ remember the theory of negative entropy articulated in the same text.

Measuring cellular metabolism and its exchanges of energy between inside and outside, Schrödinger comes to the conclusion that life does not follow the second law of thermodynamics, which states that any system of energy dissipates heat and tends to a final equilibrium and uniform temperature (Freud’s death drive was an application of this law to psychic life): everything burns and eventually cools down. On the contrary, aside from consuming energy, cell metabolism is also able to accumulate it:

What then is that precious something contained in our food which keeps us from death? That is easily answered. Every process, event, happening, call it what you will; in a word, everything that is going on in Nature means an increase of the entropy of the part of the world where it is going on. Thus a living organism continually increases its entropy or, as you may say, produces positive entropy and thus tends to approach the dangerous state of maximum entropy, which is death. It can only keep aloof from it, i.e. alive, by continually drawing from its environment negative entropy which is something very positive as we shall immediately see. What an organism feeds upon is negative entropy. Or, to put it less paradoxically, the essential thing in metabolism is that the organism succeeds in freeing itself from all the entropy it cannot help producing while alive. (Schrödinger, 1944:70)

The renowned reaction of photosynthesis transforms solar energy and stores it in the carbon rings of sugar and cellulose. This flow of energy feeds the whole ecosystem all the way up to predatory animals and the civilisation of machines too ('fossil fuel' was indeed living matter once). Going upstream, this flow of energy continuously challenges the law of entropy, which is the tendency of the mineral world to dissipate energy. Schrödinger freezes the enigma of life itself in the formula of negative entropy. Even if entropy can be measured in physical and mathematical terms, Schrödinger recognizes here one of the limits of science.

How can the two fundamental intuitions of *code-script* and *negative entropy* (that is, *information* and *energy*) be put into a new relation with each other? Schrödinger was aware of the limits of the language metaphor that he introduced (and that would soon occupy the whole stage of biology). Genetic code is indeed a strange 'language':

The term code-script is, of course, too narrow. The chromosome structures are at the same time instrumental in bringing about the development they foreshadow. They are law-code and executive power—or, to use another simile, they are architect's plan and builder's craft—in one. (Schrödinger, 1944: 22)

A chromosome is architect and craftsman in one, Schrödinger notices. Yet this image is not precise enough. Semiotically speaking, as Deleuze and Guattari (1987) also argue, there is no semiotic relation in genetic transcoding. If the linguistic triad *expression*, *content* and *object* is made of the same substance, then no relation of reference—no sign—is possible. The logical impasse relies on the fact that DNA is made of the same amino acids that it is meant to shape. Following Schrödinger's allegory, the architect and craftsman would be made of the same bricks of the house to be built.

To escape such a neurotic impasse, Deleuze (1988; 1993) applied the elegant notion of the fold to genetic code. As in a baroque sculpture, inorganic matter can form itself into the most sophisticated shape simply by folding and refolding, with no need for external or transcendental intervention. The cell membrane separates organic from inorganic as a fold of the inorganic itself, which establishes an inside and an outside:

An organism is defined by endogenous folds, while inorganic matter has exogenous folds that are always determined from without or by the surrounding environment. (Deleuze, 1993: 10)

'Life' starts from this first separation. In primitive cells a second fold occurs later in the shape of genetic memory (sometimes wrapped in a further third fold: the nucleus). Reproduction is a fold and break of the cell membrane itself, and so on, following the transformations of morphogenesis. If the cell membrane is the first fold of organic matter, in order to preserve a positive balance of energy, the appearance of the second fold of genetic code (and subsequently all the folds of morphogenesis) can be understood as a further medium developed to preserve energy through re-production. In this sense, code itself is a medium of energy surplus and Weismann's continuity of the germ-plasm or Dawkins' theory of the 'selfish gene', for instance, are reversed.

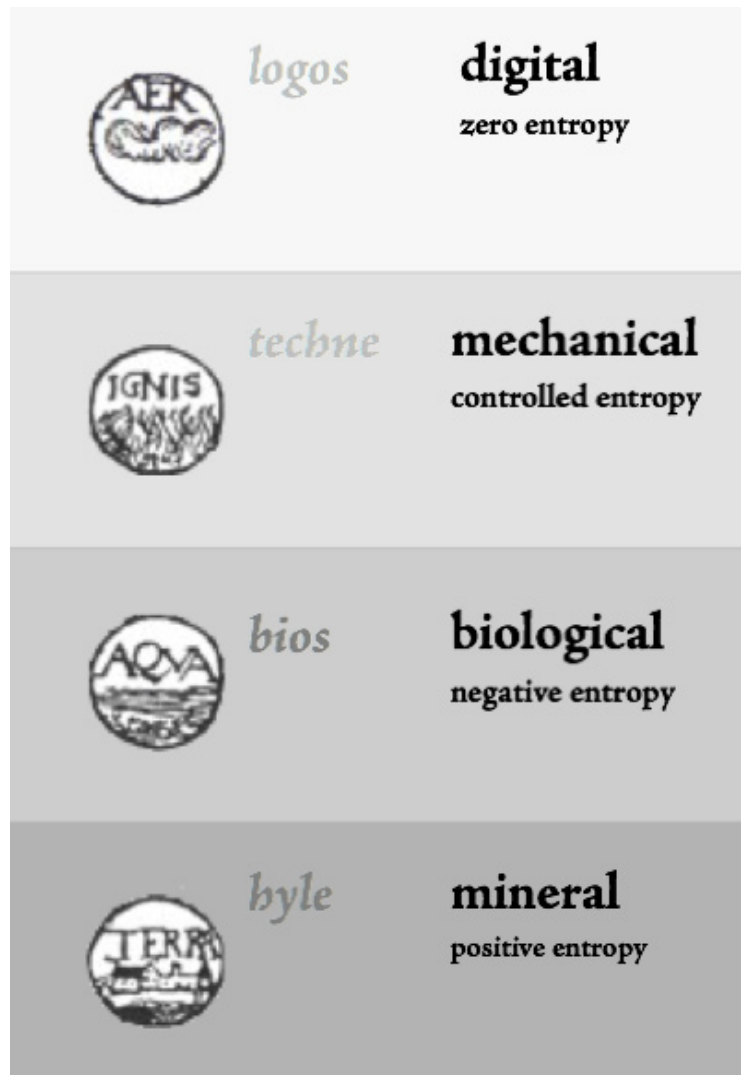


Figure 1: Diagram of the four regimes of entropy (in metaphorical relation with the four elements doctrine of ancient thought).

From Popular Genetics to an Ecology of Genetics.

An organism's physiology and behaviour are dictated largely by its genes. And those genes are merely

repositories of information written in a surprisingly similar manner to the one that computer scientists have devised for the storage and transmission of other information—that is, digitally. —The Economist, ‘Drowning in data’, 26 June 1999.

The Central Dogma of molecular biology first enunciated by Francis Crick in 1958—genetic information goes from DNA to RNA to protein and never flows back—has now been debunked by genetic research: epigenetic processes and horizontal gene transfer are widely demonstrated. If the supremacy of DNA over cellular reproduction is contested, however, the metaphors of language and code still maintain a dominant position, especially in ‘popular genetics’ and its superficial account in the mass media. The abuse of a ‘language talk’ in genetics has been criticised by many biologists and scholars (Roof, 2007; Kay, 2000; Syed, Bölker and Gutmann, 2008; Griffiths, 2001; Smith, 2000; Godfrey-Smith, 2000). However, the purpose of this essay is not to discuss genetic reductionism but to track the different typologies of the continuum that make it possible to switch and apply metaphors, paradigms and protocols across different domains.

More recently, following the progress of bioinformatics and through the mediation of the code metaphor, ‘digital talk’ has reinforced the ‘language talk.’ The abovementioned quote from *The Economist* condenses a digital continuum for the masses in a few lines. Yet the roots of biodigitalism are old. In 1948 Cybernetics was ambitiously conceived by Norbert Wiener (1948) as the discipline of ‘control and communication in the animal and machine.’ As the science writer Matt Ridley put it:

Genes are just chunks of software that can run on any system: they use the same code and do the same jobs. Even after 530 million years of separation, our computer can recognize a fly’s software and vice versa. Indeed the computer analogy is a good one. (Ridley, 1999: 24)

These interpretations are also very common within the circles of so-called ‘bioart’ and critical thought. Once a continuum between the domain of DNA and the digital was established, other forms of new media culture flowed along this conveyor belt: hackers became *biohackers*, digital divide became the *biodigital divide*, etc. (Thacker, 2005). Alex Galloway and Eugene Thacker, for instance, describe organisms as ‘biological networks’ in their recent book *The Exploit*:

The widespread use of computer databases (GenBank), Web-based gene-finding algorithms (BLAST), and automated genome sequencing computers demonstrates the principle of base pair complementarity in silico, in addition to the in vitro and in vivo. In short, the increasing integration of cybernetics and biology has resulted in an informatic view of life that is also a view of life as a network. (Galloway and Thacker, 2007: 51)

In their reading, the basic grammar of nucleic acids makes possible a continuum between different substrates and their interoperability:

As an informatic principle, as a concept concerning “informed matters,” base pair complementarity can operate across different material substrates, be it in the living cell, in a petri dish or test tube, or, more recently, in a computer. (Galloway and Thacker, 2007: 51)

The notion of biological networks is valuable as it opens up the narrow horizon of the code to a more flexible ‘system theory’ or ‘network theory.’ However, it still represents a relational and non-energetic paradigm. There is no space for ecology and for an extended notion of cellular within the followers of the Code. Concerns about biohazard and genetic pollution, for instance, are very low among the supporters of the ‘new economy’ of biotech. A decade after the dot-com crash, *The Economist* writes enthusiastically about the potential of the new generation of biohackers:

Many of the world’s great innovators started out as hackers—people who like to tinker with technology—and some of the largest technology companies started in garages... But what about biology? Might biohacking—tinkering with the DNA of existing organisms to create new ones—lead to innovations of a biological nature? The potential is certainly there. (The Economist, ‘Hacking goes squishy’, 5 September 2009)

Four Regimes of Entropy and Metabolism

The etymology of ‘organism’ points back more to energy than to ‘organisation’: the Greek word for tool or instrument, *organon* comes from *ergon*, that means energy — a notion that is paradoxically missing in all the linguistic and digital based interpretations of the cell. The energetic regime of an organism, however, neither resembles the thermodynamics of technology nor the thermodynamics of inert matter. Schrödinger clearly distinguished two worlds separated by the fold of the cellular membrane. One follows the standard laws of thermodynamics, the other is able to reverse the energy arrow and accumulate energy *against* its dissipation. Despite the fact that *hyle* and *bios*—inorganic and organic matter— are made of the same atoms, their energy is organised in a different way and some molecules, like the carbon rings of sugar, are produced only beyond the ‘barrier’ of organic synthesis.

The first massive violation of the domain of natural entropy occurred with the introduction of the heat engine that launched the industrial revolution. A heat engine is basically a device that converts thermal energy to mechanical output, nevertheless burning and dissipating more energy than what is actually transformed. Industrial machines are designed to perform work and release energy in a constant and controlled flow — *techne* is domesticated entropy. They are energetically closer to the inorganic world than to living matter. They consume more than nature and consume nature itself: after a few centuries their polluting by-products have visibly altered the biosphere.

The informatic revolution introduced a further and different entropic regime. Computers consume little energy compared to mechanical engines (although obviously the former work in partnership with the latter). More precisely, a Turing machine, being an abstract machine, does not refer to any material substratum and consumes almost zero: it runs in an ideal and virtual space at zero entropy. Digital networks are purely mathematical spaces: no gravity,

no friction, no entropy whatsoever. The ethics and aesthetics of the digital, its Free Culture and Remix Culture, are possible thanks to such a virtually zero-energy engine. Swarm intelligence and peer-to-peer cooperation are easier to operate in this environment, and new cognitive monopolies like Google are easier to establish. Compared to industrialism, the age of information has obviously a different kind of an environmental impact. The domain of the digital code—the sphere of *logos*—is an (almost) zero-entropy domain.

If the energetic perspective of cellular metabolism replaces the physics of inorganic states, a parallel terminology can be introduced. Entropy is in itself a *negative* notion as it measures disorder, and negentropy can be reversed into a *positive* measure of energy accumulation if seen from the perspective of cellular metabolism. It follows that the normal regime of the living is *metabolic* (the ability to fix energy), inorganic matter is *antimetabolic* (spontaneously dissipating energy), mechanical machines are *parametabolic* (as they consume organic energy in a controlled way) and Turing machines are (almost) *ametabolic*.

These four different regimes of entropy and metabolism change the morphology of the machinic continuum introduced by Deleuze and Guattari and later articulated by Delanda. Their landscape is injected here with the notion of energy surplus and their 'geology' gets coloured by a stratification of four different densities of energy. Whereas in Deleuze and Guattari strata are sliding over each other, here movements are more viscous. A post-structuralist materialism should include the rule that strata can be compared and combined only on the basis of their entropic density, they can be 'double-articulated' and composed in a language precisely on the basis of their different density, but then they can never be *homogenised* into one another.

What Deleuze and Guattari call an 'isomorphism of forms' among the strata is disfigured by passing through different regimes of energetics (Deleuze and Guattari, 1987: 51). The laws of the positive entropy *hyle* cannot easily describe the negative entropy *bios*, as the ametabolic *logos* fails at imitating the lively metabolism of the *bios*. And so on. Any geology needs a tectonic.

Conclusions: Tectonics of the Machinic Continuum

The general equation of photosynthesis is quite simple and the enzyme chlorophyll is well known, yet the whole process is still mysterious: carbon dioxide + water + light = sugar + oxygen, the formula states. Or: $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light} = \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$. Similar to the 'inventors' of perpetual motion machines, some scientists tried to extract chlorophyll from plant cells to discover unsurprisingly that it stops functioning outside its environment. Today DNA can be easily manipulated, but not even one molecule of kitchen sugar can be synthesised in as elegant a way as plants and algae do. Curiously, *genetics* (the study of cellular reproduction) seems to cover a simpler domain when compared to *metabolics* (the study of cellular energy cycle). Yet life's activity appears to be more about *trans-energetic* processes than *trans-coding* processes. Photosynthesis remains ahead of genetics as the real chemical barrier to working with life. It marks a clear layer of matter that features a different organisation and a higher density of energy.

Deleuze and Guattari's notion of machinic continuum was especially conceived to fight those 'sub-religions' of separation that fetishise a particular stratum, such as the fundamentalisms of linguistics, vitalism and scientific determinism. However, Deleuze and Guattari's stratification recounts no particular cases of resistance or friction:

It is difficult to elucidate the system of the strata without seeming to introduce a kind of cosmic or even spiritual evolution from one to the other, as if they were arranged in stages and ascended degrees of perfection. Nothing of the sort. The different figures of content and expression are not stages. There is no biosphere or noosphere, but everywhere the same Mechanosphere. (Deleuze and Guattari, 1987: 77)

Even if they declare that 'there is no vital matter specific to the organic stratum, matter is the same on all the strata', they recognise a specific 'abstract Animal' which composes and decomposes the molecules of the inorganic substratum into the organic one (Deleuze and Guattari, 1987: 51). From the point of view of the entropy balance, the machinic continuum of Deleuze and Guattari, however, breaks in new asperities, and new tensions become visible along the faultlines of the major strata. Tectonic forces are active in the background. The diverse strata that have been mentioned in this article start to collide like continental plates. Delanda's *continuum* of 'non-organic life' encounters an obstacle growing from below, in cellular metabolism itself: the laws of physics that Delanda relies on can describe the emergent properties of self-organisation, but not the accumulation of energy surplus. At the same time, descending from above, the biodigital continuum of popular genetics and biohackers stops at the same level: code cannot explain the metabolism of energy and obliterate it. The plane of immanence discovers its own tectonics of tensions, frictions and asymmetries.

This tectonic model composed of the four main strata of different energetic densities clarifies the initial questions of this essay: how to apply the forms of biology to the mediascape, how to inject *bios* into *techne*? Conversely, how to apply the forms of the digital to the biological, to convert the forms of *techne* into *bios*? The fallacies of code reductionism (describing life metabolism from the abstraction of the digital) and the biodigital continuum have already been mentioned. Biodigitalism has its specular twin in a sort of *digital vitalism*. Indeed before the rise of bioinformatics, the pseudo-science of memetics tried to apply genetics to culture. In his book *The Selfish Gene*, the evolutionary biologist Richard Dawkins (1976) used the term 'meme' to describe a unit of human knowledge analogous to the gene, imagining that similar processes of biological replication were happening in the noosphere as well. More recently and in less deterministic fashion, also via a Guattarian reading of media ecology, scholars have tried to describe the mediascape as an ecosystem and recognise forms of life specific to the digital. As Jussi Parikka writes: 'biological creatures like viruses, worms, bugs and bacteria seem to have migrated from their natural habitats to ecologies of silicon and electricity' (Parikka, 2005). Deleuze and Guattari believed indeed that 'cultural or technical phenomena [may provide] a fertile soil, a good soup, for the development of insects, bacteria, germs, or even particles' and that the industrial age may be defined as 'the age of insects' (Deleuze and Guattari, 1987: 77).

Along such a biomimetic continuum, the strong definition of Artificial Life attributed to John von Neumann went further when claiming how life can also be understood outside a particular medium. A similar reading, however, is found in Delanda's neomaterialism, where phenomena of self-organisation, coagulation and sedimentation are abstracted and translated among different domains. Deleuze and Guattari have been interpreted in different ways when they describe the isomorphism of the continua:

A semiotic fragment rubs shoulders with a chemical interaction, an electron crashes into a language, a black hole captures a genetic message, a crystallization produces a passion, the wasp and the orchid cross a letter... There is no 'like' here, we are not saying 'like an electron,' 'like an interaction,' etc. The plane of consistency is the abolition of all metaphor; all that consists is Real. (Deleuze and Guattari, 1987: 77)

Their poetic gloss outlines a zero gravity space embraced by a homogeneous density of energy. On the contrary, if a machinic ecosystem has to be conceptualised in relation to the digital space, it has to be through the exploration of a zero-entropy frontier in its connections with a negative-entropy motherland. Instead of forcing *biomimesis*, such an investigation should track *biomorphism*, that is, the stratification and transmission of energy surplus through frictions, asymmetries and condensations. The machinic paradigm is to be rebooted on an entropic notion of energy instead of the ontology of endless flows.

This new diagram of entropy also clarifies the biomimetic models exported to politics and in particular the model of the *swarm*. Why are 'swarms' so easy to constitute on digital networks? Because they grow in a zero-entropy space. To what extent then can they be exported offline to reinforce a real political organisation? Any biopolitics of networks should measure the different densities of energy and entropy as they affect the gradient of cooperation and exploitation, organisation and monopoly online and offline. If DeLanda proposed the introduction of a *stratometer*, a conceptual instrument to measure rigid structures, supple structures and 'lines of flight', the landscape of entropy deserves a *surplusmeter* to sound the asymmetrical accumulations of energy across nature and networks but in particular across the domain which affects our lives the most: the economy (DeLanda, 2005; Eliot, 2004). Surplus accumulation emerges then as the basic diagram of biomorphism.

Biographical Note

Matteo Pasquinelli (PhD, Queen Mary University of London) is a writer, curator and academic researcher. He wrote the book *Animal Spirits: A Bestiary of the Commons* (2008), co-edited *C'Lick Me: A Netporn Studies Reader* (2007) and edited *Media Activism* (2002). He writes frequently on French philosophy, Italian operaismo and media culture. Website: www.matteopasquinelli.com

References

- Bataille, Georges. *The Accursed Share*, vol. 1, New York: Zone, 1988.
- von Brücke, Ernst Wilhelm. *Vorlesungen über Physiologie [Lectures on Physiology]*, 2 vol. Vienna: 1873-1874.
- Dawkins, Richard. *The Selfish Gene*, Oxford: Oxford University Press, 1976.
- DeLanda, Manuel. 'Nonorganic Life', in Jonathan Crary and Sanford Kwinter (eds). *Zone 6: Incorporations*, New York: Urzone, 1992.

DeLanda, Manuel. *A Thousand Years of Nonlinear History*, New York: Zone Books, 1997.

DeLanda, Manuel with Protevi, John and Thanem, Torkild. 'Deleuzian Interrogations: A Conversation', unpublished, 2005, www.dif-ferance.org/Delanda-Protevi.pdf

Deleuze, Gilles and Guattari, Félix. *A Thousand Plateaus: Capitalism and Schizophrenia vol. 2*, trans. Brian Massumi Minneapolis: University of Minnesota Press, 1987.

Deleuze, Gilles. *Foucault*, trans. Sean Hand, Minneapolis: University of Minnesota Press, 1988.

Deleuze, Gilles. trans. *The Fold: Leibniz and the Baroque* trans. Tom Conley, Minneapolis: University of Minnesota, 1993.

Economist. 'Drowning in data', 26 June 1999.

Economist. 'Hacking goes squishy', 5 September 2009.

Eliot, Albert. 'A Thousand Marxes', *Mute, online magazine*, 21 January 2004, www.metamute.org/A-Thousand-Marxes

Freud, Sigmund. *Beyond the Pleasure Principle*, London: Hogarth Press, 1920.

Galloway, Alexander and Thacker, Eugene. *The Exploit. A Theory of Networks*, Minneapolis: University of Minnesota Press, 2007.

Godfrey-Smith, Peter. 'On the Theoretical Role of Genetic Coding', *Philosophy of Science*, n. 67, Chicago: University of Chicago Press, 2000.

Griffiths, Paul E. 'Genetic Information: a metaphor in search of a theory', *Philosophy of Science*, n. 68, Chicago: University of Chicago Press, 2001).

Hardt, Michael and Negri, Antonio. *Multitude: War and Democracy in the Age of Empire*, New York: Penguin, 2004.

Haeckel, Ernst. *Generelle Morphologie der Organismen*, Berlin: Georg Reimer, 1867.

Haeckel, Ernst. *Anthropogenie*. Leipzig: W. Engelmann, 1879.

Haeckel, Ernst. *Kunstformen der Natur*, Leipzig: Verlag des Bibliographischen Instituts, 1904.

Kay, Lily E. *Who Wrote the Book of Life? A History of the Genetic Code*, Stanford: Stanford University Press, 2000.

Kelly, Kevin. 'God is the Machine', *Wired magazine*, December 2002, www.wired.com/wired/archive/10.12

Margulis, Lynn. *Origin of Eukaryotic Cells*, New Haven: Yale University Press, 1970.

Margulis, Lynn and Sagan, Dorion. 'Marvellous microbes', *Resurgence* 206: 10–12, 2001.

Parikka, Jussi. 'The Universal Viral Machine: Bits, Parasites and the Media Ecology of Network Culture', *CTheory*, 15 December 2005, www.ctheory.net/articles.aspx?id=500

Parikka, Jussi. 'Politics of Swarms: Translations between Entomology and Biopolitics', *Parallax*, 14:3, 2008.

Pilkington, Ed. 'I am creating artificial life, declares US gene pioneer', *The Guardian*, 6 October 2007, www.guardian.co.uk/science/2007/oct/06/genetics.climatechange

Prigogine, I. and Nicolis, G. *Self-Organization in Non-Equilibrium Systems*, New York: Wiley, 1977.

Prigogine, Ilya and Stengers, Isabelle. *Order out of Chaos: Man's new dialogue with nature*. London: Flamingo, 1984.

Ridley, Matt. *Genome: The Autobiography of a Species in 23 Chapters*. London: Fourth Estate, 1999.

Roof, Judith. 'From Protista to DNA: Freud's Psychoanalysis of Single-Celled Organisms'. In: Cary Wolfe (ed.) *Zoologies: The Question of the Animal*. Minneapolis: University of Minnesota, 2003.

Roof, Judith. *The Poetics of DNA*. Minneapolis, MN: University of Minnesota Press, 2007.

Schrödinger, Erwin. *What is Life? The Physical Aspect of the Living Cell*, Cambridge: Cambridge University Press, 1944.

Serres, Michel. *The Parasite*, trans. Lawrence R. Schehr, Baltimore: Johns Hopkins University Press, 1982.

Smith, Bradon. 'The Price of Metaphor is Eternal Vigilance: Language Metaphors in Popular Genetics', *The International Journal of the Humanities*, vol. 6, n. 10.

Smith, John Maynard. 'The concept of information in biology'. *Philosophy of Science*, n. 67. Chicago University of Chicago Press, 2000.

Syed T., Bölker M. and Gutmann, M. 'Genetic information or the indomitability of a persisting scientific metaphor', *Poiesis & Praxis: International Journal of Technology Assessment and Ethics of Science*, vol. 5, n. 3-4, September 2008.

Thacker, Eugene. 'Networks, Swarms, Multitudes', *CTheory*, 18 May 2004, www.ctheory.net/articles.aspx?id=422

Thacker, Eugene. *The Global Genome: Biotechnology, Politics, and Culture*. Cambridge, Mass: MIT Press, 2005.

Wiener, Norbert. *Cybernetics: Or Control and Communication in the Animal and the Machine*. Cambridge, Mass: MIT Press, 1948.



The LOCKSS System has the permission to collect, preserve and serve this open access Archival Unit



The Fibreculture Journal is published under a Creative Commons, By Attribution-Non Commercial-No Derivative licence.



OPEN HUMANITIES PRESS

The Fibreculture Journal is an Open Humanities Press Journal.

The Fibreculture Journal

DIGITAL MEDIA + NETWORKS + TRANSDISCIPLINARY CRITIQUE

// issue 17 2011 unnatural ecologies

issn 1443-1449



FCJ-118 Faulty Theory

Matthew Fuller
Goldsmith University

Theory suggests a certain means of cleaving closer to the world by arranging a trick of distance from it, to be able to stand back from the onrush of things by attending to a pattern and thus recognising them more deeply. It offers partaking in a dance of expansion and contraction of thought, one of immanence and transcendence twisting and running through each other in recursive yet unrepeatable movement. This range of dynamics is one that may often be frozen, codified, subject to measurements or called to order in numerous ways and which in turn may offer its own sets of tests and cruelties. Yet it has no inherent speed, or necessary scale of operation, but it is the activation of the movement in which it is found.

An examination of theory's trajectories through media ecologies could take a number of turns. One might: follow through the way in which it is articulated through filiations of ideas and genealogies and their relation to specific media; work through the histories of the book and of texts, in technologies, markets and other modes of circulation; trace how transformations are enacted on and through theory by means of politics, technology or wider cultural shifts; or explore how theory sets itself up as a residue catcher of other domains. One might track theory as a kind of peer-reviewed cultural industrial waste, but it may also suffice to pay attention to this movement of theory, and some of the different kinds of revealing faultiness it makes possible.

This essay suggests how media theory might think alongside what it gets rather wrong, the phenomena which fuel its capacities of misrecognition and with which it overlaps: to think theory as media in the way that it addresses, modulates, transmits, and provides interference. I propose to do this both through engagement with two writers, Charles Fort and Alfred Jarry, who exemplify certain excellences of error and through analysis of an interesting kind of object characteristic of Cybernetics: thought experiments carried out in hardware.

One of the things that the media ecologies approach works with is the perspectivalism of media systems, with their efficiencies, abstractions, reductivism, blockages, abundance and erratic plenitude, the way they couple with, entangle, and provoke the trickiness of the world. These elements provide crucial points of inflection and invention in

the movement of theorisation in relation to other currents of matter. Theory as a kind of media can be partially understood as a range of ways of thinking, writing, speaking, publishing, of using and working with a relatively closed and identifiable kind of thought, responding to it, inhabiting, testing and ignoring what it triggers. As such, theory has its own genres and histories of perspectivalism. The relationship of theory to the disciplines of judgement and assignation and in a certain disfigured but still highly operative way, with what educational jargon figures as 'practice', are all crucial to its status, limitations and capacity for acuity, perversion and delight.

Faulty theory works in relation to this domain of practice, but also inherently with its perspectivalism. Decision-making or thought triggering mechanisms, devices that work on their own sensorial capacity couple with modes of writing and thinking that deliberately work with theory's fault-lines. Such faultiness might include: those moments when a thought, in order to move beyond itself into the ideas of others and thus get reconfigured, turns itself into a printed word, changing its form of liveness and mutability; the way in which epistemological concerns shade into or fecundate hidden ontological masses and abruptions; the way in which a series of logically formulated statements, within a certain scale of logicity are converted, by means of a series of devices, into physical behaviours. Such faultiness arises due to the multiplicity of such movements and the trickiness of the way in which such processes are in turn gamed, misapprehended, and applied.

The assumption of perspectivalism is crucial to Nietzsche's understanding of the relation of thought to life and error or partiality is what can be relied on as a condition: 'In a world of becoming in which everything is conditional, the assumption of the unconditional, of substance, of being, of a thing, etc., can only be error. But how is error possible?' (Nietzsche, 2003: 35 [51]). [1] The question is left in the air, a slowly descending periwinkle amongst many in these notebooks. Later, other errors, the results of evolutionary or intellectual specialisation at the scale of the organism or species, or of the maintenance of a system of struggles that 'wants to preserve itself' (1[24]) at the level of social or ecological systematisation, are figured as those things that 'enable organisms to live' (1[28]). This is contrasted with the inorganic world whose stasis corresponds to a certain kind of perfection and 'no narrowness of perspective' (1[105]). The latter point is one that was challenged by Deleuze, for whom everything, even the inorganic mass of the great pyramids, is evaporating, decaying, undergoing morphosis and evading its precise description or measurement. For Nietzsche, however, error remains a condition of life. Not only this, it can be said that it is something that at other scales can be said to gain its own kind of motility, irritability and capacity of reproduction and variation.

How might one speak or think or love in a way that is beyond requiring an illusory, unconditional truth, since such an ideal is unavailable? How might this be possible while recognising that not all things that constitute the conditions of truth, indeed at times possibly very few of them, are available for recognition by thought, where thought as such is understood as a partial precondition for theory? The expansiveness of theory, its ability to move across scales or moments, is one means of surmounting such a state but also something that ensures its fallibility. Error, Nietzsche suggests, is inevitable, since the ability to fully comprehend a world in its becoming is something that would dissolve a single human sensorium, an entity which is itself constructed as a 'regulative fiction' (35[35]). The sensorium is an error with a certain kind of dependable faultiness, a patterning with a particular set of constancies. This difficulty in itself is a condition which both necessitates the capacity of theory to move ideas from one place or process to another, to recognise aspects of an occurrence which bear traces of another and which in turn renders theory ill-fitting. Error also arises under this condition of inadequacy, not quite able to capture what it once was or might be. The transitions between one kind of error, misrecognition, fault or insight and another, also thus induce error of a different kind and require some means of tricky recognition. The sensoria arising in order to experience, intensify and articulate such conditions are inherently mediatic, an example of which we can attempt to construct here to mark some of the transitions 'in kind' of faulty theory.

Cybernetic Thought Machines

Given the emphasis on the relation of error to life, it is fitting that error, rather than the primacy of its correction, came to be seen as the driving force, specifically one that enables learning, in the speculative pre-history of artificial life and artificial intelligence before these terms were locked down. Within the field of these thought experiments carried out in hardware, possibly the most indicative are Grey Walter's Tortoise, [2] a robot, or 'Machina Speculatrix' and precursor to biomimetic robotics which, when its batteries were low, 'fed' itself by recognising and going to a recharging point indicated by a light; the various conversational learning devices of Gordon Pask; [3] and the Homeostat, a device for self-perturbation and balancing, staged in electrical currents, designed by W. Ross Ashby. Machines as arguments, exemplars and behavioural experiments that recursively figure the nature of the machinic, couple with the need to produce tangible results that is crucial to engineering but also with a culture of a science parodying itself. An instance of such wry self-recognition, not itself ostensibly concerned with error, is Claude Shannon's 'Ultimate Machine', a number of versions of which were made, consisting of a box containing a motorised arm and some simple controls. When a switch outside the box was pressed, the lid would open and the arm emerged. Its purpose: to flick the switch and de-activate itself. [4]

W. Ross Ashby, a psychiatrist, neurologist and mathematician, was interested, amongst other things, in the brain's possible points of liaison with, not homology to, computers. As such, he was in correspondence with Alan Turing due to his interest in the ACE computer in Manchester (Hodges, 1985: 359-360), active in cybernetics and a member of a related group, the Ratio Club (an informal discussion group on cybernetics, information theory, and related areas meeting between 1949-58), contributing work crucial to the definition of self-organisation (Ashby, 1947: 125-128).

Ashby's was one of a range of machines made as intellectual arguments by people involved in the development of cybernetics and has attracted commentary by Jean-Pierre Dupuy, Katherine Hayles, Andrew Pickering and others for its processual reflexivity and the complexity of its behaviour. [5] What is interesting here is his idea for another machine, a Mechanical Chess Player presented at the ninth Macy Conference in 1952, the same one so energised by the Homeostat (Ashby, 1953: 151-154). This machine was not to be one of those that simply by the exertion of number-crunching brute force 'beat' its opponent, but would rather, by means of a certain style 'outplay' them.

Ashby's Mechanical Chess Player takes the example of a position in chess that is so random looking that it is uninterpretable even to experts and yet contains within it a subtle solution. In such a condition, only two classes of player can find the checkmate, one is that of beginners, due to their erratic decisions and the other is that of those who are utterly random in their selection of moves. This is the first principle of this machine. The second is that it has the power to learn, to go over moves and train itself via the accrual of a weighed memory of past sequences.

This specific machine was not constructed but its style is what I am after here, this ability to go for broke, to spring into something so luminously clanging that a noise producing mechanism, in Ashby's suggestion a geiger counter, might be enough to trip the possibility of unpredictable or turbulent insight into being. [6] In his late, unfinished, and sombrely brilliant work, *Aesthetic Theory*, Adorno introduces the figure of the child who plays the piano, understood as a particular systematisation of sound, convinced that by some form of luck or intuition they might be

able to press a sequence or combination of keys that had been hitherto unheard (Adorno, 2004, 41). [7] He suggests that the hope of realising this combination is equivalent to the search for the new, that is an instance of utopia. Adorno presents this as an endless but forlorn longing. There are too many forces of likelihood intersecting in the mechanism to achieve the unconditional. It is perhaps inevitable that he sets up this melancholy state since the new, in his hands, is an endlessly troubled category, allergic itself to its constitution as such. Perhaps the piano would induce such a noise if it were arrayed with other instruments, or better, if it were slightly broken. That is to say, if it were to find a means of thinking that is not primarily categorical. Indeed, since every machine, every mechanism, is tendentially broken in some way, every piano slightly out of tune, the simple repetition of pre-ordained sounds and structures is perhaps the least we have to worry about. While it would be rather flippant to rely on this for the production of utopia this is nevertheless one way in which error is possible.

Such insight is not solely of analogue circuits or keyboards, hammers and strings, but of words, visions, ideas, that engender realities by figuring them out. Ashby's chess player reveals something because it introduces an understanding of the game of chess that is not limited to its actuation as a domain of simply virtuoso intelligence. It becomes a space of learning, change. I want to look at two theorists who work by possibly related means, theorists who introduce the idea of the fault as an inevitability of the movement of thought. Their work introduces the ability to think with broken figurations of reality, the blunt inevitability of doing so, and sets out to work exactly at the point where insight crosses over into the cack-handedness of ideas. By means of such a relentlessly bent clear-sightedness we might recognise the cretinous allure of faulty theory.

Charles Fort

Charles Fort is a founder of research into anomalous phenomena: rains of frogs falling from clear skies; statues crying blood; aerial migrations of periwinkles; babies that are born reciting the scripture in a language their parents have never heard. What he asks again and again is, not whether these are special cases but why some things are attended to and others left to float free of observation. His is an account of the world that demands the idea of an 'underlying oneness' yet piles mound after mound of fragments in a giant flea-market of wonder and gob-smacked revelation.

Fort's writing is moody, rambling, delightful, in parts utterly disorganised, while at other times meticulous and dry. It is filled with the demented cataloguing of uneventful wonders, misfit cosmologies but also studded with shocks of insight like finding little bubbles of space dust or battery acid in your porridge. His work is not one of explanation but of the vast amassing of questions, compiling note after note on unsystematised strange events, and these are all events, things that occur: whether they are statements, descriptions, explanations, or the anomalies that give rise to them. Importantly, as his is a work that resists the temptation of explanation, he also evades the resort to conspiracy theories. Fort does however give us some figures for a life of thought. In his book *Lo!*, named after the word star-gazers are supposed to utter upon discovering a new planet, he says that 'a theory finds its way through surrounding ignorance - the tendrils of a vine feel their way along a trellis - a wagon train feels its way along a prairie' (Fort, 1941: 7).

He is rather immodest as his theory is both the wagon and the prairie in that he builds the voluminous files of the proofs of the multiplicity of the world and then sets out to travel amongst them. The basic components of the landscape arrive mixed in with what counts as news, learned discourse and other materials found in the New York Public Library or, during a stay away from the stacks of his native city, the British Library: papers, journals, books, articles and other indexing systems. It is an endless trawling for triggers towards the unexplained. It would be interesting to compare the indexing systems of Fort and that of Paul Otlet, the pre-First World War proponent of the first universal information, learning and network system (with institutional branches covering specific media) to be housed in a proposed Brussels-based institution called the Mundaneum (which perhaps lives on in the Universal Decimal Classification system) to see if there was one iota of correspondence between their respective systems in terms of what they studied or considered to be either real or registerable as a component of reality. Both produced massive archival systems, Otlet of everything that fits into the world, and Fort of everything that falls into it.

To have a feel for such monomanias is to have a sense for media. Whether we are attempting to skirt a motion detection sensor, to sniff out a sorting system as it operates on some resource allocation, or to sense the difference between a universalisation or the existence of a parallel universe, their mutual inherence and the affordances of thought and experience they set up remind us of the error of our ways, as Nietzsche notes: 'There is no event in itself. What happens is a group of phenomena selected and synthesized by an interpreting being' (Nietzsche 2003: 1 [115]). Things that happen ripple in and out and interfere with other ripples and scales of coherence and their capacities of sensing and ideation.

Comparing the groping of theory to the way that a vine feels its way along a trellis should not necessarily be understood as a metaphor. A vine moves according to the constraints its construction allows for. It 'selects' without consciousness on the basis of whether it is afforded the chance to put down suckers, gain succour from sunlight or draw support from an underlying strut or branch. This kind of movement, what Samuel Butler calls the 'certain low cunning' of the potato (Butler, 1931: 236), is echoed by Isabelle Stengers when she points to the empirical approach to the unknown in Deleuze and Guattari's articulation of the plane of immanence which calls for a permanent 'groping experimentation' (Stengers, n.d.). For reasons of some internal necessity, Fort later comes round to the proposition that the wagon train is headed westwards because some force or entity has seeded the ground in advance with slugs of gold. Rather than random process there is entelechy (Fort, 1941: 185). Any meditation on faulty theory will reveal the multiplicity of the kinds of fault achievable. Fort relies, for his moments of faulty perception, on the shift in and out of perspectival scales and the moments of fuzziness that lie in between moments of focus, rather than on moments of truth and the process of transport between them.

At the same time, he maintains a criticality towards approaches that attempt to develop aspects of such an experience. Fort (1941: 166) imagines Henri Bergson appearing on the floor of the New York Stock Exchange to preach intuition in October 1929, when Wall Street lost 90% of its capital. In the reverse of the way that much of the cream of academic work while highly trained and learned essentially consists of stating the obvious in grindingly extended detail, faulty theory is in advance of intuition because it allows you to be systematically wrong, to extend and provoke your capacities of perception with feeble or grotesquely overgrown antennae.

Fort's writing is chaotic and full of shocks, both elliptical and direct, working by means of chains of association and implication. Raw rant is butted up against gentle suasion. The giant index of anomalies that he builds up, which itself

ends up lost to a fire, attempts to erode consensus reality by the steady drip-drip of accrued information. We could say that in this respect he was the counter-media for voiceless worms, strange births, wolf-children, lights in the sky and luminous owls. There is in his work a persistence and a tenacious registration of difficulty.

Alongside this mode of erosion, Fort's writing offers something else: the immense accrual of data generates a new form of possibility for relations between things. There is something in this amassing of a dataset that at a certain point induces the generative force of that which it indexes. The anomalous entities gathered in his files of thousands of bits of paper generate, by simple massive accumulation, a gravitational force. Atoms of ideas start to swerve between them, as if the 'clinamentic' fall away from consensus might, after several hundreds of thousands of cases, start to mean that a few of these pieces of data start to cling together. In doing so, perhaps they seed another universe (Fort, 1947: 10).

If Charles Fort decried what he saw as the closed minds of science and modern understanding, whilst working with certain analogues of its methods inducing specimen cases of its faults and producing new kinds of attention to error, another writer, Alfred Jarry, deliberately chose to work the fault-line by means of insubordination (Fuller, 2008). Insubordination is the movement by which things refuse to remain in a stable position, a moment when subordinate or minor knowledges gain the means to 'explain' those above them and the domain of reference of those formally above is unable to register that transition. Insubordination produces, as in the case of Fort, an elaboration of a faulty form of knowing that is explicitly textured by power. Such an explanation is always knowingly ruptured but it is also reflexive, articulating in some way the collapse it is part of: 'Everyone who is attacking something is sailing on a windmill, while denouncing merry-go-rounds' (Fort, 1947: 165).

Alfred Jarry

A pupil of the over-intuitive schoolteacher Henri Bergson, whose work is enjoyed in the text, 'How to make a Time Machine', Alfred Jarry began a copious discharge of writing in his twenties, which took place in the 1890s. All of his texts imply an approach to ideas that is as lively as Fort's, but in a way in which everything is metatextual and parodic. For Jarry, a text is always speaking through other texts. Such infestation is not in the mode of an artful mumbling deferral but through the cretinous nature of half-remembered ideas, over-interpretation, taking things as read or a joyous grasping hold of the trajectory of the governing inanities. The means for ascertaining truth are grasped as a means of derangement, partly through the impossibility of stabilising a statement in a world constituted by becoming. One can only feasibly set sail in a sieve (Jarry, 1996: 15). We may say that we now live in a society in which moronisation is systematically encouraged or enforced, or at least assumed as a fundament but perhaps even stupidity is still under-mobilised as a resource. Jarry trumps such a position by mobilising expressive stupidity in all forms of thought and in their existence as ideolects. The particular kind of faultiness that in his hands yields its under-recognised expressivity most emphatically takes on this form of expressive stupidity.

Jarry incorporates Symbolist modes of writing, folkloric motifs and archaic linguistic forms such as the heroic accounts of great men but what he plunders most is the language of science. This is done at the very moment when it

really begins not only its formalisation but also the way in which it shapes reality by being applied. The Romantics' dolorous and recessive responses to science were incapable of beating it by out-complaint or by tumultuous vision: something more buggy had to be done. His joining of the latest in scientific jargon and ideas with deliberately *recherché* puns, obscure in-jokes, Medieval French familiar from Rabelais, and both the polysemic onslaught of Symbolism and the slew of aesthetic movements attending the change from the Nineteenth to the Twentieth Centuries, produces thrilling divagations from correctness somehow disgorged from within these discourses through a very proper rigour.

Jarry's use of scientific ideolects was not simply that of parody or appropriation. He attempted to write in a way which produced a doubling of science, a way of thinking that would remain scientific but not be restrained simply to positivism or, if it were, one that through the maniacal belief in a positivism taken to its ultimate state would render itself gloriously visionary in the way that a soldier who follows all orders to the absolute letter renders themselves free (Jarry, 2006). Science, as a word, is always capitalised. It becomes a thing. A noun that is not just something that occurs in time but possesses other dimensions and affordances: to crack skulls, to provide scaffolding for tottering towers of filth or usefulness in rinsing out a boat (Jarry, 2001: 43).

But Science is only one form of organised knowledge, and religion is another, and then there is Phynance -- a magical form of matter which can access and re-organise all the others. Science itself becomes neo-scientific, ahead of the ideational game, famously described by Jarry as 'Pataphysics, a form of knowledge which is as much beyond metaphysics and metaphysics is beyond your common or garden physics' (Jarry, 1996, 22-23). In its status as the science of the laws governing the exceptions to scientific laws, 'Pataphysics founds itself upon paradox, moments when the movement of logic coils in on itself, only to spring back open and engulf the world.

Part of what 'Pataphysics does is to take scientific or other ideas and ways of framing and figuring the world to their logical conclusions, in order to amplify their effects. In doing so, it reveals something about what it comes into combination with and the limits and productive powers of the disciplines, theoretical corsets and ideational affordances of science, or indeed of media theory itself. All the world's a diagram, a model that gives ornate handles to itself. Sylvère Lotringer notes how much this process of amplification fed into the work of Jean Baudrillard in his search for means of pushing systems to their limits (Lotringer, 2008: 13). Jarry delights a little more in his own wreckage and has less to mourn. Jarry's 'Pataphysical texts derange the way in which objects, beliefs, codes, norms and our ideas about them, all fit into some nicely ordered lattice. 'Pataphysics recognizes and works with the inter-relations between things and by its recognition re-orders them. This is to say, it recognises, in a diplomatic sense, the existence of the functional belief in things such as causation, deduction, hypotheses, explanation, thought and progress. What it re-orders is the too-ready congruence of the relations between such processes in a lasting grammar of implicate sense. Technologies, instruments, and machines; politics, hierarchies, societies; languages, ideas, titles; laws, manners, ritual; anything that can be ordered triadically, for example, and seem to make sense simply by being so ordered as a series, allow for an admirable efficiency in language and ideas as well as in work and reasoning. Relations can be made between things efficiently and there is a smoothness and consequentality to their observance that allows things to get done. But they are also rather nauseating and appalling in the very stability of their mutual comprehensibility, their respectful minuet of consistency and heterogeneity. There is inevitably a paranoia and over-anticipation at the heart of the dance.

Misrecognition, the way in which a word or a term is misheard, a thing is misused, an organ takes leave of its allot-

ted sensuality, yet can still be acted upon or with, suggests a para-grammar between objects and ideas that might as well exist alongside that which we are placid enough to expect. A metric or device is misapplied but still yields results or the same kind of failure. Like the discovery of the pulsar, which cohered as a super-dense star producing a pattern of releases of electromagnetic energy, previously interpreted by the few interested readers of radio-astronomical instruments as the noise of arc welders, electricity supply lines or other nearby interferences, things which momentarily cohere as having an identity disappear back into the condition of noise (Hewish, Bell et al., 1968: 709-713). The stupendous, mundane and irritating fading and waxing of beliefs and the universes which hold them together is the cosmology within which Jarry writes. A belief, technique or machine that promises us controllable high speed, the future, or endless primal sex, framed by a belief in valves, pistons, calculations, levers, cranks, laws, the joyful stupid readiness of a taboo, themselves provide an instrumentation with which the passage of such forces can be rendered capable of leaving a few lines of ink on the chart.

Cybernetic Doubt

Compared to Ashby's mechanical chess player, which despite the immense variety of possible combinations of moves and positions in a game of chess, is ultimately still, as per Adorno's pianist, playing with a finite set of possible states, an interpretation of the world which also shapes and takes part in the world has more to deal with. And it is here we can see a transition to the concerns of second-order cybernetics in its shift in emphasis from solipsistic feedback loops located in specific devices, to spirals, loops and labyrinths of causality.

This wave of cybernetics feeds the imperative of productive doubt learned from Physics in both its early stages into its other sources of conditioning and inspiration. This can be observed both in the invention of instruments or the difficulty of staging a witness to the manipulation of a singularised variable in the world (Shapin and Shaffer, 1989) and, in the phases immediately preceding the birth of cybernetics, in the reflections on the position of the observer and of uncertainty in the work of Bohr, Heisenberg and others. [8] Behaviourism, logical reduction, appetites for control and an empire-building holism are all mobilised, alongside an equally foundational sense of doubt.

Heinz von Foerster, whose constructivism replaces ontology entirely with epistemology, considers it an ethical imperative to avoid the use of the 'existential operator' in language, to not use statements such as 'it is', 'here is', 'it is like this' (von Foerster and Poerksen, 2002: 27). For von Foerster, whilst these statements might allow some perspectival purchase on aspects of reality, such terms tend towards giving the speaker or listener an illusory position. Such phrases are those of the sovereign making orders but as history progresses they are degraded into the lesser currency of the bourgeois, who senses in science 'the dominance of the cosmos and the universal exaltation of the experience of freedom' (Negri: 2006: 161). In such a cosmology, theory alone is refined and precise; practice, which it nevertheless explains, is messy and confused, full of awkward compromises or reference to too many scales of reality.

One way to make faulty theory is to speak in a language infested with existential operators but to elicit other kinds of existence from them. Such a condition is exemplified in the shuddering science of Dr. Faustroll the 'Pataphysician, or in Jarry's concerned journalism about the public menace of the killer pedestrian (Jarry, 2001: 232-235). Operating by related means is the emphasis on behaviours rather than representations in the machines made as thought experiments. Mathematical theorems work as little machines in text, axiom by axiom establishing their demonstrations. Philosophers trick out their geometry with words, with

what they trigger, grasp, miss and produce. Machines of circuits and dials make their arguments by carrying them out, their perspectival delimitation is palpable and is the condition of their power.

In such a tradition, Gordon Pask once described himself as ‘a philosophical mechanic’ (Bateson, 1972: 307), a role that comes along because he is a ‘bad mathematician’, an interesting echo of the tradition of Natural Philosophy and its later incarnation in the work of inventors such as Michael Faraday who found out about electricity by making gadgets with which to generate and handle it. From the 1950s onwards Pask made machines to find out about how they work and how they learn but layered this with some cunning (Pask, 1971: 76-99). Pask emphasised the design of ‘underspecified’ machines that would gain functions and involvements from use rather than assume them in advance. Walter’s tortoise too worked by means of underspecified and interlocking rule-sets. The tortoise is, the assumption goes, influenced by one key datum – the strength of light to which it is drawn. The navigation of the tortoise, steering between more than one light and processing the instruction to head towards the light in order to recharge its batteries, went through a ‘dazzle’ effect in which complex behaviours of multiple attraction and evaluation can be seen. As Fort says of knowledge, ‘Out of what was a clarification, new complications have arisen, and that again will come [and] flux towards simplification or clarification’ (Fort, 2008, 349).

All of these machines and theories share a common characteristic: like Ashby’s chess playing machine, there is a low level of internal representation. The machine doesn’t have to learn what the pieces are or what they mean but only what might be a good manoeuvre given the circumstances. The thinking here is not theory by hypothesis conditioned by trial and error, giving rise to a theory which is ultimately only ‘significant’ at that scale, but theory as a behaviour.

Such behaviours may indeed manifest themselves at multiple scales, indeed, cannot help but iterate in their dimensions of relationality. What is surprising and intriguing is the existence of entities, organic, instrumental, aesthetic or intellectual, that may seek to trap, trace, describe or imagine and test, to theorise and invent, these events and conditions. [9] At present, some of the most compelling work of this kind is carried out in software art or in music, in which algorithmic argument is made out in wry dysfunction or in sound and dances that jigger and propitiate both normality and devices of general equivalence. But in terms of theory itself, faulty theory suggests a strongly materialist relation to language that sees it not only as a mode of representation but also as something thicker and more powerful and awkward. Working with the behaviour of linguistic, ideational, or medial structures suggests an ethology of the synthetic rather than a necessarily interpretative work. As such, the faulty theory of media ecologies emphasises what can be done with media before the rather more limited question of what they mean. To approach this question of what can be done through theory is inherently faulty, an act of perspectival misrecognition, unless it is theory itself that ceases the illusion of cleansing itself of its bugs and instead offers them its bed.

Bitten by such bugs, theory that is faulty describes and takes part in the world without precluding change. As such, it is not an approach that can be assimilated to any form of relativism but rather, in its inherent difficulty, triggers a reflexive circulation of the transformation of ideas and the ways in which we might make them, hold them, or be used by them and exist through them. Faulty theory in media ecologies moves from working with the capacities and affordances of theory as words with a strong relation to the printed page, that is the work of the text and its imaginary and disjunctive relation to thought, to also entertain and recognise other forms of ideational devices, robots and blags, as well as the ruses of things, rules and jokes.

What is the burden to be shouldered amongst all this movement of inevitable perspectivalisms, this superabundance of mistakes, graspings and imagination, with all its deformations, dazzling and miscomprehension, amongst ever partial capacities to grasp and to invent? Fortunately or unfortunately, it is a propensity to laugh.

Acknowledgements

Thanks to Michael Goddard and Jussi Parikka for organising the Media Ecologies sessions at the MeCCSA conference in Bradford in 2009 and for developing this issue of the Fibreculture Journal. Thanks also to all at the Institute for Cultural Research at Lancaster University who hosted and responded to an early version of this paper, to Andy Goffey whose work on stupidity and the knowledge economy was also presented there, and to Olga Goriunova for much faultless advice. Two anonymous reviewers for Fibreculture gave it the benefit of disarmingly acute thought. Thanks also to Rolf Pixley, to whom this text is dedicated, for the timely copy of *Lo!* and for many discussions of cybernetics.

Biographical Note

Matthew Fuller's books include *Media Ecologies: Materialist Energies in Art and Technoculture*, *Behind the Blip: Essays on the Culture of Software* and the forthcoming *Elephant & Castle*. With Usman Haque, he is co-author of *Urban Versioning System v1.0* and with Andrew Goffey, of the forthcoming *Evil Media*. Editor of *Software Studies: A Lexicon* and co-editor of the new *Software Studies* series from MIT Press, he works at the Centre for Cultural Studies, Goldsmiths, University of London. <http://www.spc.org/fuller/>

Endnotes

[1] Friedrich Nietzsche, *Writings from the Late Notebooks*. The referencing convention followed here follows that used in the above volume. The notebook number appears first, with the fragment number following in square brackets.

[2] The Grey Walter Online Archive which documents the tortoises can be found at <http://www.ias.uwe.ac.uk/Robots/gwonline/gwonline.html/>, A short nicely contemporary video of Walter's tortoises can be seen at <http://www.youtube.com/watch?v=ILULRImXkKo/>. See also, W. Grey Walter, 'An Imitation of Life', *Scientific American*, 182(5) 150: 42.

[3] See, for an overview of several such devices: Usman Haque, 'The Architectural Relevance of Gordon Pask', in, *4dSocial: Interactive Design Environments*, (London: Architectural Design, 2007).

[4] See, for more on the Ultimate Machine, <http://lightbucket.wordpress.com/2008/02/13/claude-shannon-really-ought-to-be-more-famous/>.

[5] See respectively Jean-Pierre Dupuy, 'Aspects of a Failure', *The Mechanization of the Mind - On the Origins of Cognitive Science*, trans. M. B. DeBevoise (Princeton: Princeton University Press, 2000), N. Hayles, *How We Became Posthuman*, (Chicago: University of Chicago Press, 1999) and Andrew Pickering, 'Cybernetics and the Mangle: Ashby, Beer and Pask', *Social Studies of Science*, Vol. 32, No. 3, 2002: 413-437.

[6] The following session in the conference describes a possible relation between sensory stimulation through habituation to unpredictable water and the growth patterns of the planktonic crustacean, *Daphnia*. Such turbulence is linked back to the randomness at the core of the Mechanical Chess Player.

[7] The boy in the *Naked Lunch* who can play a flute with his ass and is thus 'really an individual in bed' able to produce 'notes in the unknown, tie-ups of seeming dischords' is perhaps a related idyllic figure. See William S. Burroughs, *The Naked Lunch*, (London: Paladin, 1986), 133.

[8] See Niels Bohr, *Causality and Complementarity: Epistemological Lessons of Studies in Atomic Physics*, (Woodbridge, CT: Ox Bow Press, 1999) and Werner Heisenberg, *Quantum Theory and Measurement*, trans., J. A. Wheeler and H. Zurek, (Princeton: Princeton University Press, 1983).

[9] See Vilém Flusser, 'Shamans and Dancers with Masks', in, *The Shape of Things, a philosophy of design*, trans., Anthony Matthews, (London, Reaktion Books, 1999) 104-107.

References

Adorno, Theodor. *Aesthetic Theory*, eds. Gretel Adorno and Rolf Tiedeman, trans., Robert Hullot-Kentor (London: Continuum, 2004).

Ashby, W. Ross. 'Principles of the Self-Organizing Dynamic System', *Journal of General Psychology*, 1947, Vol.37: 125-128.

Ashby, W. Ross. 'Mechanical Chess Player', in Heinz von Foerster, Margaret Mead, Hans Lukas Teuber, eds., *Cybernetics: Circular Causal and Feedback Mechanisms in Biological and Social Systems*, transactions of the ninth confer-

ence, March 20 and 21, 1952 (New York : Josiah Macey, Jnr. Foundation, 1953), 151-154.

Bateson, Mary Catherine. *Our Own Metaphor: A Personal Account of a Conference on the Effects of Conscious Purpose on Human Adaptation*, (Washington, Smithsonian Institute Press, 1972).

Bohr, Niels. *Causality and Complementarity: Epistemological Lessons of Studies in Atomic Physics*, (Woodbridge, CT: Ox Bow Press, 1999).

Burroughs, William S. *The Naked Lunch* (London: Paladin, 1986).

Butler, Samuel. *Erewhon or, Over the Range* (London: Jonathan Cape Traveller's Library, 1931).

Dupuy, Jean-Pierre. *The Mechanization of the Mind - On the Origins of Cognitive Science*, trans. M. B. De Bevoise (Princeton: Princeton University Press, 2000).

Vilém Flusser. *The Shape of Things: A Philosophy of Design*, trans. Anthony Matthews (London, Reaktion Books, 1999).

Fort, Charles. *Lo!* (New York, Ace Books, 1941).

Fort, Charles. *The Book of the Damned: The Collected Works of Charles Fort* (New York: Jeremy P. Tarcher, Penguin 2008.)

Fuller, Matthew. 'Aesthetics of Insubordination', in: Inke Arns, *Hardware Guide to Irrational.org* (Dortmund: Hardware Medienkunstverein, 2008).

Haque, Usman. 'The Architectural Relevance of Gordon Pask', in *4dSocial: Interactive Design Environments* (London: Architectural Design, 2007).

Hayles, N. Katherine. *How We Became Posthuman* (Chicago: University of Chicago Press, 1999).

Heisenberg, Werner. *Quantum Theory and Measurement*, trans. J. A. Wheeler and H. Zurek (Princeton: Princeton University Press, 1983).

Hewish, A., S. J. Bell, J. D. H. Pilkington, P. F. Scott and R. A. Collins, 'Observation of a Rapidly Pulsating Radio Source', *Nature*, No. 217, February 1968: 709-713.

Hodges, Andrew. *The Enigma of Intelligence* (London: Harper Collins, 1985).

Jarry, Alfred. 'Black Minutes of Memorial Sand', trans. Paul Edwards and Anthony Melville, in: *Adventures in 'Pataphysics, Collected Works of Alfred Jarry, Vol. 1*, Alastair Brotchie and Paul Edwards, eds., (London: Atlas Press, 2001), 43.

Jarry, Alfred. 'Days and Nights: Memoirs of a Deserter', in: *Three Early Novels, Collected Works, Vol. 2*, (London: Atlas Press, 2006).

Jarry, Alfred. *Exploits and Opinions of Dr. Faustroll, Pataphysician*, trans. Simon Watson Taylor (Boston: Exact Change, 1996).

Lotringer, Sylvère. 'Remember Foucault', *October* 126, Fall 2008: 3-22.

Negri, Antonio. *Political Descartes: Reason, Ideology and the Bourgeois Project*, trans. Matteo Mandarini and Alberto Toscano, (London: Verso, 2006).

Nietzsche, Friedrich. *Writings from the Late Notebooks*, Rüdiger Bittner, (ed.) (Cambridge: Cambridge University Press 2003).

Pask, Gordon. 'A Comment, a Case History and a Plan', in: Jasia Reichardt ed., *Cybernetics, Art and Ideas*, (London: Studio Vista, 1971), 76-99.

Pickering, Andrew. 'Cybernetics and the Mangle: Ashby, Beer and Pask', *Social Studies of Science*, Vol. 32, No. 3, 2002: 413-437.

Shapin, Steven and Simon Schaffer. *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1989).

Stengers, Isabelle. Gilles Deleuze's Last Message, Online at Recalcitrance: <http://www.recalcitrance.com/> (n.d.).

von Foerster, Heinz and Bernhard Poerksen. *Understanding Systems: Conversations on Epistemology and Ethics*, (Heidelberg: Carl Auer Systeme Verlag, 2002).

Walter, W. Grey. 'An Imitation of Life', *Scientific American*, 182(5) 150: 42.



The LOCKSS System has the permission to collect, preserve and serve this open access Archival Unit



The Fibreculture Journal is published under a Creative Commons, By Attribution-Non Commercial-No Derivative licence.



OPEN HUMANITIES PRESS

The Fibreculture Journal is an Open Humanities Press Journal.



FCJ-119 Subjectivity in the Ecologies of Peer to Peer Production

Phoebe Moore
University of Salford

Introduction

Free (Libre)/Open Source Software (FLOSS) is an open, evolutionary arena in which hundreds and sometimes thousands of users voluntarily explore and design code, spot bugs in code, make contributions to the code, release software, create artwork, and develop licenses in a fashion that is becoming increasingly prevalent in the otherwise hugely monopolised software market. This 'computerisation movement' emerged as a challenge to the monopolisation of the software market by such mammoth firms as Microsoft and IBM, and is portrayed as being revolutionary (Elliot and Scacchi, 2004; DiBona, Ockman, and Stone, 1999; Kling and Lacono, 1988). Its 'ultimate goal' is 'to provide free software to do all of the jobs computer users want to do and thus make proprietary software obsolete' (Free Software Foundation, 2005).

However, if it is to succeed in bringing about a new social order (Kling and Lacono, 1988), this movement must be re-evaluated from a critical standpoint through a look into the practices of knowledge production based on radical licenses for property sharing and development such as the General Public Licence (GPL) and the emerging subjectivities of participants. Free Software may be viewed as a social movement while Open Source is perhaps a development methodology, but it is not always necessary to isolate analysis to one or the other, firstly due to the extensive overlap in software communities, and secondly because their rhizomatic roots emerge from a shared intellectual and moral response to the exploitation of markets by powerful firms (see Elliot and Scacchi, 2004). Here, I query whether the activities of collaborative software producers as well as hardware production communities such as those found in FabLabs, which release playbots and other blueprints for machine replications as well as agricultural and construction initiatives, can indeed be perceived as revolutionary due to their subversive work and production methods. The recursive communities (Kelty 2006; Powell 2008) that develop around these practices are linked, with shared practices, goals and self-perceptions. People's emerging subjectivities are the most important dimension of such radical production ecologies, because they reflect both the immaterial and material dimensions of the inherently political projects involved.

Social theorists including Hardt and Negri (2001), Boutang (2008), Lazzarato (1996), and Virno (2002) discuss new technologies' appropriation of work as an immaterial and conceptual (and sometimes slavish) activity. The extraction of surplus value from work in the creative and cultural industries, as well as from any employment relationship built on new technologies, is a new and unique category of potential exploitation. This is interestingly also less bounded to the Fordist piece rate work structures of management and the wage relation. The appropriation of the self, of the hegemony of the subject involved, is part of the neoliberal capitalist project. This can also be seen in education and employment policy, as I have demonstrated in my 2010 book (Moore, 2010). There I claim that governments and the elite transnational capitalist class struggles to adapt to, and subsume, potential revolutionary factions within the knowledge and information economy. These struggles provide tensions within the P2P community likewise, as I indicate in my work with Paul A. Taylor (2009). This work analyses participants' motivations for getting involved in usually unpaid FLOSS projects when simultaneously facing the precarious world of work. In spite of these tensions, I argue here that the creative and networked industries provide the components for creating post-capitalist relationships, or if that is somewhat optimistic, at least a challenge to capitalist relationships. Explicit methods of immaterial and material production and emerging P2P ecologies are built on tenets that defy capitalism and allow subjectivities that blossom outside of the dominant models that are fraught with competition and rivalries.

At the University of Maine Law School's Fourth Annual Technology and Law Conference, Portland, Maine, Professor Eben Moglen argued that:

Free software is an invocation for particular social purposes of the ability to develop resources in commons... it is the single way in which we have produced the most important works of Western intellectual achievement since the Renaissance. It is also the way in which we have managed for all time fisheries, surface water resources, and large numbers of other forms of resource beyond human production. Free software presents an attempt to construct a commons in cyberspace with respect to executable computer code. It works. (Moglen, 2003)

FLOSS projects have an intense focus on open source and the collaborative 'philosophies' of free software. Yet many hardware production projects, alternative currencies, and FLOSS-related ecological and environmental activism also share a concern for the planet's sustainable future. In the process, they rework the production of subjectivity. For example, geek publics, as emerging from community wireless projects, are another instance of a relevant oppositional subjectivity (as seen in the work of Powell [2008]).

This article, then, is about the subjectivities of people involved in peer to peer (P2P) production. P2P is a model or perhaps, better termed, an ecology of production that aims to defy and resist the hierarchies and the rules of ownership that drive productive models within capitalism. It may also offer possibilities for workers' formations of radicalised subjectivities. The argument that the P2P ecologies of production are groundbreaking and emancipating is found for example in the work of Bauwens (2009) and Benkler (2006), among others. Criticisms leveled at the phenomenon include those contained in case studies by people involved, such as Zawinski's (1999) account of work on Mozilla. Critics point to the clique-like activities of producers, suggesting that P2P producers 'cease to be a bazaar model and turn into a core team, which to a lot of people is a polite word for a clique' (Cox, 1998).

In response, I will investigate a range of projects that aim to provide a lived alternative to the existing dominant

modes of capitalist production. These provide an alternative model, better termed an 'ecology'; not a *model of* capitalism, but an *ecology* of potential post-capitalism. The increasingly successful ecologies of cooperative and collaborative production have become a threat to globalised information capitalism, as much through contributors' value systems as through material outputs. In this sense, the global capitalist passive revolution that I have identified in other work (Moore, 2007, 2010) is likely to be challenged.

I look at the media ecology or 'ecosophy' of P2P software and hardware production as something that begins with people's subjectivities, is perpetuated and reproduced by subjectivities-in-common, and becomes the core for a potential revolution. Networked communities of P2P production are, in the sense of free software, virtual. These groups are made up of geeks, artists, hackers, designers, carpenters and programmers, all of whom are committed to a radical ecology based on tenets that defy the proprietary and competitive relations that dominate the majority of productive relationships in the current, seemingly post-industrial, digital age. P2P production communities are composed of the following three dimensions: social relations, human subjectivity and the environment (see Guattari, 2008, for a breakdown of these categories). It is the new configuration of the relations between these that could effectively challenge existing hegemonic social relations of production. So this article first looks at how critical theorists may understand the relationship between P2P activity and the subjectivities formed within networks. More specifically it looks to the way the objectives of producers and artists affect the development of subjectivity within recursive communities. The article then looks at the activities within communities of the software and hardware producers themselves.

Considering Subjectivities

Conceptions of how subjectivities are formed are now dramatically altering in the light of developing technologies and the new ways in which people interact with technology. The dark side of this, reflected in government policy, is not the only dimension of this transformation. In fact, there is an emancipatory potential within relationships that can now be established with the new uses of technology, and with new patterns for governance outside old industrial capitalist hierarchies. On the other hand, attempts to harness the potential for revolution, evident within the P2P production movement which I discuss in following sections, are also increasingly evident in government policy that tries to dictate and define subjectivity through educative means. The struggles over the vectors of subjectivation involved, as discussed in Guattari (2008) and Colman (2008) are, as Goddard states in the present volume, part of a 'mental ecology in which sensibilities, intelligence and processes of desire take place'. This is thus also the 'site where politics take place' (Goddard in this issue).

If P2P production becomes an alternative and revolutionary space, it will be via the possibilities for the formations of revolutionary subjectivities that may emerge as people become increasingly involved in 'passionate work' in the digital and cultural economies (McRobbie, 2009: 123) where this kind of production occurs. This could ultimately involve challenging global capitalist hegemony, not only through a new distributed aesthetics but also new affective subjectivities. The subjectivity as well as social status of the capitalist him/herself is challenged with competing collaborative forms of subjectivity. As these new types of self identifications are developed within organic social movements, transformation becomes increasingly possible.

Here Matthew Fuller's (2005) provocative adaptation of the concept of media ecology is useful. Fuller refers to media *ecologies* that allow for more dynamism between the relevant components, relationships and methods by which ecologies are co-created, often in response to a perceived absence of something in society, or as an attempted response to perceived social violence. For Fuller, for example, pirate radio emerged in the context of people's desire for fringe cultural expression and for multiplicities emerging from 'multiple networks of production, multiple locations ... multiple media forms ... sustained by scenes and rhymatic drives that refuse to give in' (2005: 52). Rather than the traditional static relationships of mainstream media such as broadcaster/audience, producer/consumer, manager/managed, these new media ecologies allowed people the space for self expression and thus creation of alternative subjectivities, as well as potentials for the transformation of the world around them with the use of technologies.

To elaborate the potentials in new subjectivities in this context, one can turn to Deleuze and Guattari's (1987) adaptation of Foucault's treatise on subjectivation, or the process of becoming subject, as a biopolitical power struggle. To challenge the 'major crisis of our era', Guattari emphasises that we need to work together to cultivate:

- A nascent subjectivity
- A constantly mutating socius
- An environment in the process of being reinvented. (2008, 45)

Here, I intend to look at a lived example of the commons to identify how the multitude may express itself in a potentially subjectively revolutionary ecology, wherein production of the self can be owned separate to the results of interpellation, where capitalism is no longer the horizon of subsumption and where multiplicity can become both singular and shared in a way that disrupts the contemporary hegemony of capitalist norms, such as the proprietary ownership of ideas within digital production.

However, this mode of aesthetico-political subjectivity differs from the more celebrated forms of 'creative freedom'. Most critical theorists have viewed aesthetics as a domain reserved for artists and 'creatives', and this paralysis continues in the work of Richard Florida and Charles Leadbeater, 'insiders' who busily decide on best working practices and design the future of work (Amoore 2006, 26), and who have celebrated promises in which 'creative freedom, design stardom, and self-expression drives designers to work in temporary or freelance jobs and to forgo financial security thus feeding capitalism an endless supply of young, fresh talent' (Turner-Rahman 2005). As Withersford points out however 'inside this bourgeois dream lie the seeds of a bourgeois nightmare' (1999, 5-6). McRobbie (2002) and Amoore (2006) note that this exhilarating promise in practice facilitates the capitalist project and makes it difficult for workers to unionise and thus to protect themselves.

On all nodes of the spectrum from the far right to the radical left, changes to the workplace, the removal of job security and casualised professional work alongside widespread casualisation, and the rise of flexibilised precariat maintenance and/or types of service work, are issues that have been associated with the rise of technological developments during what has been called the age of information, 'new times', the global knowledge-based economy, high-technology societies, technetronic societies, and so on. Capital has been able to reinvent and 'socialise' itself in these contexts, as seen in the restructuring of education around a perceived ideal type of employable and socialised worker. The result is that we are seeing a conscious fusion of capital with society that can have a range of affects on people surviving within its grip.

In this situation, labour has supposedly become dematerialised, through the elimination of skill as tangibly measured and explicitly identified with the producer herself. This is a contemporary continuation of the capitalist project of alienation. In addition, work is removed from fixed capital through the transference of the practices involving owned property into unprecedented arenas of commodified knowledge by way of information technologies. Labour power is thus removed from the factory and immaterialised through deterritorialisation, which is the 'disconnection of the conscious organism from its identity code, the effect of non-acknowledgement of the imaginary' (Berardi, 2009: 150). With identity and thus representation removed, cognitive work appears to exist in direct competition with the computer. Post-Fordist capitalism realises Stalin's formula: 'man is the most precious capital' (cited in Gorz, 1999: 6). The individual is now expected not only to work, but also to valorise his/her own work, and to become a competitive entity with capital itself through the incorporation of his/her own subjectivity into the practice of work.

The infatuation with a new creative world of work or 'playbour' hints toward a seeming turn from labour in the traditional model wherein surplus value is owned by capitalists. Theorists of cognitive capitalism suggest that knowledge workers are expected to contribute endlessly to value creation by way of personally directed lifelong learning and mass intellectuality. Virno and the advocates of *operaismo* note that work is not just alienated from the producer in the capitalist relationship of production, but in fact, life is completely subsumed by work (2002). The Italian 'workerists' disagreed with Gramsci's thesis on the war of position (which loosely, is the idea that positioning one's strategic advantage is as important as the attack) and instead advocated direct action: the *multitude* that results is a movement that will enact radical transformation and change through a radical configuration of subjectivities. While this movement has differences with Gramscian theories of power, the commitment to ideas and emancipatory possibilities located within the superstructure are shared. [1]

A growing population of over-qualified, highly skilled individuals now work in the 'internal margins', or the internal ghettos, that line the sidestreets resulting from a growing lack of stable employment within the market for knowledge workers. As a result of the emerging impermanence of work, and as knowledge becomes increasingly commodified, several contradictions have emerged. For example, 'reflective statements' and cognitive scaffolding (Pedagogy for Employability 2006) are prioritised over recursive community building, or commons based production. Assumptions extend into the realm of people's abilities and skills, despite the difficulties that knowledge work poses for traditional distinctions between the objective or technical skill needed for task related work and the subjective, social capabilities that are now increasingly measured by employers in a 'war for talent' (Brown and Hesketh, 2004: 65-88).

Peer Production and the Commons

The peer to peer production movement originated in the Free Software and Hackerspace communities. These communities represent a social movement to an extent, although 'movement is an awkward word; not all participants would define their participation that way' (Kelty 2008, 113). Some people participate because this is a 'pragmatic methodology' that shares 'practices first and ideologies second' (113). Nonetheless, FLOSS and the open hardware community is composed of some radical people who are committed to explicitly go beyond the strictures of capitalist production processes in a way that can overcome the measures of value that have controlled the employability (and thus subjectivity) discourse until now. While government led employability and skills campaigns have created a specific ideologue of the seemingly employable worker, the peer production protocol is composed by an ecology of interactivity that offers an alternative set of practices to capitalism. This is an ecology in which people are seen

to be free to individually and/or collaboratively and cooperatively identify subjectivity, or subjectivities, that are not confined to the straightjacket of competition, profit and proprietary-driven action, or the associated values these activities require.

Yet where are P2P collaborative spaces in today's real world? These include Media labs based on the model of Access Space or the Brazilian Pontos de Cultura programme, which have applied the P2P approach on a national scale; coworking spaces and social media cafes (like London's Tuttle Club); Fab Labs for manufacturing, found in locations as diverse as Iceland and Afghanistan; Vinay Gupta's Hexayurt project; Studio spaces like TenantSpin, the micro-TV station in Liverpool based in a flat in a towerblock; Hackerspaces; Community Media (Hine 2009); and Intentional Communities which include 'ecovillages, cohousing communities, residential land trusts, communes, student co-ops, urban housing cooperatives, intentional living, alternative communities, cooperative living, and other projects where people strive together with a common vision' (Intentional Communities 2010). These radical spaces are based on the following principles as set forward by the P2P Foundation:

Our mission is to extend the Open Source model to the provision of any goods and services—Open Source Economics. This means opening access to the information and technology which enables a different economic system to be realized, one based on the integration of natural ecology, social ecology, and industrial ecology. This economic system is based on open access—based on widely accessible information and associated access to productive capital—distributed into the hands of an increased number of people. We believe that a highly distributed, increasingly participatory model of production is the core of a democratic society, where stability is established naturally by the balance of human activity with sustainable extraction of natural resources. This is the opposite of the current mainstream of centralized economies, which have a structurally built-in tendency towards overproduction. (P2P Foundation 2009)

These post- or alternate-capitalist suggestions for communities that are dedicated to the 'commons' are claimed to be far more resilient to capitalist subsumption than previous communities. While market-based capitalism is based on the private ownership of the means of production and hierarchically organised corporations, this new ecology is based on shared ownership and shared upgrading/product development rights, and therefore activities that by their very nature do not permit proprietary behaviour. This movement recognises that workers are becoming increasingly empowered, a group who 'unlike factory workers basically own or control their own means of production: i.e. their brains, computers, and access to the socialised network that is the internet' (Bauwens 2009, 2). They are thus able to create scenarios or ecologies of co-creation which are decidedly 'not just about firms improving their social marketing, open innovation, community-building and learning efforts to generate new proprietary and valuable knowledge with/from their customers' (Lawer 2009). These self-organising communities impose a threat to the hegemony of the traditional firm, and because of their radical organization by way of non-market production 'there is a limit to how far such firms can "own" channels of knowledge production and are able to manage engagement when they apply a market-based logic and its associated capabilities' (ibid., citing Benkler, 2006).

People who are interested in co-creation and peer production are labouring and producing in a way that should not be treated as a curiosity or as a fad. Passionate and intelligent people living in a multitude of locations are volunteering online, for example, to co-author Wikipedia, thereby constituting a collective challenge to classical regimes of knowledge production and verification (Benkler 2006, 5-6). What we are seeing is a 'new mode of production

emerging in the middle of the most advanced economies in the world' (ibid.). This ecology of production poses a real threat to the current dominant mode and people involved are increasingly able to circumnavigate the supposed reflexive requirements for preparing themselves to become and remain employable. The autonomous worker of a networked information economy, as well as the producers of open manufacture based communities, have unprecedented power to cooperate across open spaces that were previously unavailable in the factory. Without a wage relation between the traditional definitions of employee and employed, the possibilities begin to emerge for overcoming the fundamental strictures of the capitalist employment relationship. The cultures that have emerged from this process have been discussed as being more truly democratic for nearly a decade. Both consensus and democratic means are used to lead towards becoming more fully individual or self-governing. This means using consensus or democratic means for vital infrastructure; the best and most widely adopted outcomes are from the adaptive systems created that enable an individual freedom of adaptation, without the knowledge of or permission by core developers, as these adaptations do not endanger, but merely enrich, the core design. Peer production holds the possibility for a 'genuinely new form of production' that is based on 'permission-less self-aggregation around the creation of common value' (Bauwens 2009).

Bauwens (2009) separates the terms peer production, peer governance and peer property to give a 'beginner's guide' to the political economy of P2P production:

- 1) peer production: wherever a group of peers decided to engage in the production of a common resource
- 2) peer governance: the means they choose to govern themselves while they engage in such pursuit
- 3) peer property: the institutional and legal framework they choose to guard against the private appropriation of this common work; this usually takes the form of non-exclusionary forms of universal common property, as defined through the General Public License, some forms of the Creative Commons licenses, or similar derivatives.

These practices differ significantly, indeed almost diametrically, from the traditional versions of firm-based capitalist exchanges and production. Participants are involved in constructing and reconstructing intentionally radical economic and social situations. The management and governance of related projects needs to be critically examined to assess to what extent community-based ecologies found within the FLOSS community can challenge the traditional understanding of property rights, ownership, motivation, complexity and the 'human firm' (Tomer, 1999) along with challenges to rational actor and corporate models. The community-based movement is linked to the re-creation of subjectivities that exist outside of capitalism, can produce its own economic 'truth' regime of value, and has begun to display significant possibilities for challenging the dominance of competitive capitalism. Yet the cultural and macro-structural properties of community-based ecologies of work must be contrasted to those of the firm to discern their relevance and implications for broader ethico-political changes within and across societies. For instance, in the present volume, Parikka refers to the emerging media ecological methodologies that can identify and outline 'subjectivities that do not follow the normal definitions of subjectivities based in consciousness, morals, or for example human sociality, but .. a more radical material relationality and sociability' (Parikka in this issue). In particular, the emerging open hardware community demonstrates the complexities and the potential revolutionary dimensions of 'radical material relationality and sociability'.

P2P production has been able to bring together the otherwise differently developed Free Software Foundation (FSF) and the open source movement, and now the open source hardware creating community. The latter are, for example, committed to OHANDA, which is a database of design repositories allowing collaboration, strictly operating under the GPL and copyleft licensing in hardware production projects (Powell 2011). Collaborative practices give each group of producers a subversive framework for knowledge sharing and a radical space to express subversive identities that reject competitiveness and obsessive individualism. This ecology potentially overthrows, or at least

dramatically challenges, the current dominant model of flexibilised subjectivities which are positioned around capitalist norms. Weber shows that 'authority within a firm and the price mechanism across firms are standard means to efficiently coordinate specialised knowledge in a complex division of labour—but neither is operative in open source' (Weber 2004). Yet without guaranteed wages, what are the incentives for participation and contribution? These key differences noted in participant subjectivities could indeed be the key for overthrowing the capitalist wage relationship. People within the P2P ecologies for production see themselves as autonomous producers, without the pressure of a boss and thus the capitalist employment relationship is removed. Where is the 'boss of it all' in open ecology communities? Indeed, it exists within subjectivities. While workers' knowledge within capitalist companies automatically becomes the intellectual property of employers, the FSF and FLOSS and open hardware ecologies allow a level of personal 'possession' of the product and through this formation of revolutionary subjectivities and thus the self. The recursive commons is born.

Several P2P hardware projects have emerged in recent years. These include the work of Smari McCarthy, Director of Taj Fab Lab in Jalalabad, Afghanistan and native of Iceland, and Xavier Leonard, who run the following projects and Fab Labs:

- Peer escrow identity management system
- Crowdsourced democracy system
- Mutualist monetary system
- Economic information system (CyberSyn inspired)
- Natural resource mapping system
- Arbitrary arbitration protocol
- Peer-to-peer education system
- Distributed Healthcare system
- Executive authority management

Fab Labs and related projects include:

- Vestmannaeyjar Iceland Fab Lab
- FabFi wireless project
- Afghanistan Fab Lab
- Open Manufacturing
- FOME
- Icelandic Society for Digital Freedoms

Other projects include the Manchester FabLabs project initiated by Dr. Eddie Kirkby and others, overseen by the Manufacturing Institute in Manchester. Based within the Chips Building in Manchester's New Islington area, this is the 35th Fab Lab in the world. Haydn Insley acts as Charity Project Manager. As reported by Parley (2010), Julie Madigan who is the Chief Executive of the Manufacturing Institute claims 'this is an opportunity to broaden our innovation base and increase crucial invention skills. It is a proven grass roots approach that will directly benefit the economy and different parts of the community'.

Another example is Paul Hartzog and Sam Rose's involvement in the establishment of another project entitled '21st Century Wealth-generating Ecologies and an Infrastructure for Open Everything' (Hartzog and Rose 2009). Then

there is Dr. Marcin Jakubowski's work as Director for Permaculture and Open Manufacturing, which is the basis for his Factor E Farm Project using peer production methodologies. Factor E Farm is an experiment of putting theory into practice. Dr. Jakubowski and several others have been applying P2P methodologies and codes of practice to their work since the Farm's inception. The aim is to create a 'global village construction set' and these activists are 'refining existing technologies and techniques into simple, easily replicated, open source designs with closed, zero-waste resource cycles' (ibid.). P2P workers in these communities claim to control their own manufacturing and production and see this as a crucial step toward a post-capitalist world. 'By our analysis, most of the technologies needed for a sustainable and pleasant standard of living could be reduced to the cost of scrap metal + labor. There is immense potential for social transformation once this technology is fully developed for building interconnected self-sufficient villages, since people will be freed from material constraints and able to seek self-actualization' (ibid).

Open Source Ecology is another P2P hardware project that calls itself 'a movement dedicated to the collaborative development of the world's first replicable, open source, modern off-grid "global village". By using permaculture and digital fabrication together to provide for basic needs and open source methodology to allow cheap replication of the entire village, we hope to empower anyone who desires to move beyond the struggle for survival and evolve to freedom' (Open Source Ecology 2009).

The Open Ecology peer production collaboration cycle and methodology is the following:

- Feedback throughout
- Fabrication, potentially in distributed locations
- Resource donations
- Quality markup technical drawings
- 3D computer models
- Economic analysis
- Further design
- Worknet workspace as initial development, ending in dedicated wiki webspace
- Technology administrator: for each product (ibid.)

These projects are far more than research and development activities for digital neoliberal capitalism, despite the well documented and at times successful mainstream attempts at subsumption. Within the hardware community, from the nascent stages of design and creation there is a strong commitment to collaboration and the commons. As such, these communities pose a significant challenge to post-Fordist capitalism. They go beyond the limits of preceding free software movements, due to their materiality and their capacity to generate full post-capitalist ecologies. These have a sustainability and fuller embodiment of all dimensions of sociality, beyond the limitations of free software.

Many of the people working in the commons, in both software and hardware production, are dedicated to taking the means of production away from the elite digerati as well as the corporate moguls who are the most recent reactionary examples of Gramsci's organic intellectuals (Gramsci 1971) [2]. This is despite the fact that the idea of the ecology has been integrated at some points into management discourse and cybernetics [3]. However, a real battle has begun between management interpretations of ecologies and those who intend to challenge a managerialist policy that, as stated, is becoming increasingly invasive and biopolitical. A revolution of subjectivity is needed, along the lines we have begun to see in the terms described in this article. This needs to create environments in which people can

labour and live in an interdependent and self-sustaining way, outside of capitalist modes and means of production. Can P2P production values change users' incentives, directing these towards participation in form of production that transcend competition, ownership, and profit seeking?

Towards a Conclusion

The emerging P2P ecology allows us to open a critical perspective on the technological determinism and privileging of technical innovation that now pervades contemporary neoliberal digital capitalism. Indeed, this ecological change within social and technological relations coincides with these contemporary modalities of production, seen in dominant and pervasive enterprise initiatives in every labour sector in the neoliberal era. Can the emergence of P2P participants' battle with capital transform the traditional hierarchies that characterised sites of production typical of the industrial age? The contemporary post-capitalist ecology I have described here does seem to allow workers to arrest their own self-management. They return to a situation wherein people can formulate revolutionary subjectivities and own their labour and means of production, rather than continue to be subordinated to hierarchies and deterministic views of technology and progress. The self-organising communities of peer production threaten the status quo by taking ownership of the means and modes of production. This also involves rethinking ecologies of production, beginning with the structuring of capital output into a commons from which to adopt and adapt, whether personally or communally, through the use of the General Public Licensing model which renders intellectual property obsolete.

Through 'commoning' and through the production of open software and hardware and related alternative protocols, it has become possible to challenge capitalism. Capitalist elites do counter this, cutting through the aesthetic veneer that advances the autonomous affective self (Colman, 2010: 3). Yet the peer production movement, as media ecology, still poses an active, potentially revolutionary challenge to the contemporary post-industrial project of capitalist subsumption.

Endnotes

[1] Neo-Gramscians (Bieler, Cox, Gill, Moore, Morton, Worth, etc.) have given Gramsci's theories an international dimension, and their work provides analyses of how ideas are made concrete and hegemonic, and how they continue to prevent revolution.

[2] Bearing in mind that 'organic' in this sense is not the organic we often think regarding pesticide free, genetically authentic gardens or all-natural foods and so on. Gramsci means that the elite are as capable of planting what might appear to be radical ideas as revolutionaries or subversives are, and have been able to cultivate their own species of intellectuals through forming corporate links and building alliances in ways that fuel capitalism.

[3] Lovink (2004) argues that the Internet and new media have both frightened and excited capitalists: frightened because it is in many ways still unexplored territory and provides a space that is less familiar with copyright and intellectual property restrictions; but also excited about the profit making implications.

Acknowledgements

I would like to thank Alison Powell, Michel Bauwens, Jussi Parikka, Michael Goddard, Smari McCarthy, Matthew Fuller, Athina Karatzogianni and George Dafermos for their generous comments, guidance, and support throughout the writing of this article.

Biographical Note

Phoebe has two interrelated research interests: international labour struggle; and post-capitalist models for socio-political economies that can resolve labour struggle, some of which are found in digital communities. Her recent research monograph entitled *The International Political Economy of Work and Employability* (Palgrave, Aug 2010) examines the effects of global shifts to a knowledge-based economy on people, using comparative studies of policy and the related 'employable' subjectivity and personality ideal types. Previous publications include 'UK Education, Employability, and Everyday Life' (*Journal of Critical Education Policy Studies* (2009) 7(1); and a co-authored piece with Paul A. Taylor entitled 'Exploitation of the Self in Community-Based Software Production: Workers' Freedoms or Firm Foundations?' *Capital and Class* (2009), 97: 99–120.

References

Amoore, Louise. 'Invisible Subject(s): Work and Workers in the Global Political Economy' in Matt Davies and Magnus Ryner *Poverty and the Production of World Politics: Unprotected Workers in the Global Political Economy*. Palgrave Macmillan 2006: 14 – 37.

Bauwens, Michel. 'The Emergence of Open Design and Open Manufacturing', *We-Magazine 2* (2009), <http://www.we-magazine.net/we-volume-02/the-emergence-of-open-design-and-open-manufacturing/>

Benkler, Yochai. *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. New Haven CT and London: Yale University Press, 2006.

Berardi, Franco 'Bifo'. *Precarious Rhapsody: Semiocapitalism and the pathologies of the post-alpha generation*. London: Minor Compositions, 2009.

Boutang, Yann Moulrier. *Le capitalisme cognitive*. Amsterdam and Paris: Editions, 2008.

Brown, Phillip and Antony Hesketh. *The Mismanagement of Talent: Employability and Jobs in the Knowledge Economy*. Oxford: Oxford University Press, 2004.

Bruff, Ian. 'The Totalisation of Human Social Practice: Open Marxists and Capitalist Social Relations, Foucauldians and Power Relations', *The British Journal of Politics and International Relations* 11. 2009: 332 – 351.

Colman, Felicity J. 'Affective self: feminist thinking and feminist actions', in *Contemporary French and Francophone Studies*: Site 14: 5 . 2010.

Colman, Felicity J. 'Affective Vectors: icons, Guattari, and art', in Simon O'Sullivan and Stephen Zepke (eds). *Producing the New: Deleuze, Guattari and Contemporary Art*, London: Continuum Press, 2008: 68-79.

Colman, Felicity and Christian McCrea 'Gestures towards the Digital Maypole' *The Fibreculture Journal Issue 6* 2005, http://journal.fibreculture.org/issue6/issue6_colman.html

Cox, Alan. 'Cathedrals, Bazaars and the Town Council' *Slashdot* post 13 October 1998, <http://slashdot.org/features/98/10/13/1423253.shtml>

Dahlander, Linus. 'Relationships between open source software companies and communities: Observations from Nordic firms' *Research Policy* 34 2005: 481–493.

De Angelis, Massimo. 'The Production of Commons and the "Explosion" of the Middle Class' 2009, <http://www.taller-commons.com/downloads/angelis.pdf>

De Angelis, Massimo. *The Beginning of History. Value Struggles and Global Capital*. London: Pluto Press, 2007.

Deleuze, Gilles and Felix Guattari. *A Thousand Plateaus* trans. Brian Massumi. Minneapolis: University of Minnesota Press, 1987.

DiBona, Chris, Sam Ockman, and Mark Stone. *Open Sources: Voices from the Open Source Revolution*. Pennsylvania: O'Reilly and Associates Inc., 1999.

Dyer-Witheford, Nick. *Cyber-Marx: Cycles and circuits of struggle in high-technology capitalism*. Illinois: University of Illinois Press, 1999.

Elliot, Margaret S. and Walt Scacchi. 'Free Software Development: Cooperation and Conflict in a Virtual Organisational Culture' in Stefan Koch (ed.), *Free Open Source Software Development*. Hershey, Pennsylvania: Idea Group Publishing, 2004: 152 – 173.

Free Software Foundation, 'Overview of the GNU System' 27th September 2005 <http://www.gnu.org/gnu/gnu-history.html>

Fuller, Matthew. *Media Ecologies: Materialist Energies in Art Technoculture*. Massachusetts: MIT Press, 2005.

Gorz, Andre. *Reclaiming Work: Beyond the Wage-based Society*, Cambridge: Polity Press, 1999.

Gramsci, Antonio. *Selections from the Prison Notebooks*. London: Lawrence & Wishart, 1971.

Guattari, Felix. *The Three Ecologies*. London: Continuum, 2008.

Hardt, Michel and Antonio Negri. *Empire*. Massachusetts: Harvard University Press, 2001 reprint edition.

Hartzog, Paul and Sam Rose. '21st Century Wealth-generating Ecologies and an Infrastructure for Open Eve-

rything,' paper presented at Media Ecologies and Postindustrial Production conference at University of Salford, Manchester, 3rd November 2009.

Hine, Dougald. 'The Future of Unemployment: The Situation' Agit8 09/02/09. <http://agit8.org.uk/?p=307>

Intentional Communities 2010, <http://www.ic.org/IntentionalCommunities2010>.

Kelty, Christopher M. *Two Bits: The Cultural Significance of Free Software*. North Carolina: Duke University Press, 2008.

Kelty, Christopher M. 'Geeks, social imaginaries, and recursive publics', *Cultural Anthropology* 20. 2006: 185-214.

Kling, Rob and Suzanne Iacono. 'The Mobilisation of Support for Computerization: The Role of the Computerization Movements' *Social Problems* 35.3 1988: 226-242.

Lawer, Chris. 'Market and Non-market Co-creation' in *The Empty Whitecoat*, 9th April 2009, http://chrislawer.blogs.com/chris_lawer/2009/04/market-and-nonmarket-cocreation.html

Lazzarato, Maurizio. 'Immaterial Labour' in Paolo Virno and Michael Hardt (eds). *Radical Thought in Italy: A Potential Politics*. Minneapolis: University of Minnesota, 1996, 133 - 150.

Lovink, Geert. *Uncanny Networks: Dialogues with the Virtual Intelligentsia*. Cambridge, Massachusetts: The MIT Press, 2004.

McRobbie, Angela. *The Aftermath of Feminism: Gender, Culture, and Social Change*. London: Sage, 2009.

McRobbie, Angela. 'From Holloway to Hollywood? Happiness at Work in the New Cultural Economy', in Paul Du Gay and Michael Pryke (eds). *Cultural Economy*, London: Sage, 2002, 97 - 114.

Moglen, Eben. 'Freeing the Mind: Free Software and the Death of Proprietary Culture.' Keynote address at the University of Maine Law School's Fourth Annual Technology and Law Conference, Portland, Maine (June 29, 2003), <http://old.law.columbia.edu/publications/maine-speech.html>

Moore, Phoebe. *An International Political Economy of Work and Employability*. Basingstoke: Palgrave Macmillan, 2010.

Moore, Phoebe. *Globalisation and Labour Struggle in Asia: A Neo-Gramscian Critique of South Korea's Political Economy*. London: I.B. Tauris, 2007.

Moore, Phoebe and Paul A. Taylor 'Exploitation of the Self in Community-based Software Production - Workers' Freedoms or Firm Foundations?' *Capital and Class* 97 2009: 99 - 120.

Open Source Ecology. http://openfarmtech.org/index.php?title=Main_Page

P2P Foundation, 'Open Source Ecology'. http://p2pfoundation.net/Open_Source_Ecology

Parley, Martin. 'FABricating freedom - UK's first Fab Lab', *ParleyMaterialsWorld Magazine*, 01 Jun 2009 <http://www.iom3.org/news/fabricating-freedom-uks-first-fab-lab-opens-manchester>

Pedagogy for Employability Group. Higher Education Academy/Enhancing Student Employability Coordination Team (ESECT) (2006).

Powell, Alison. 'Wifi Publics: Producing community and technology,' *Information, Communication and Society* 11:8 (2008), 1068 – 1088.

Powell, Alison. 'Challenge and Recuperation: Codifying Open-source Knowledge Flows in Software and Hardware' (presented at Media, Communications and Cultural Studies Association [MeCCSA] conference 12-14 January 2011, hosted by University of Salford at the Lowry Theatre. Now under review for *Communications Review* in March 2011).

Tomer, John F. *The Human Firm: A Socio-Economic Analysis of Its Behaviour & Potential in a New Economic Age* London: Routledge, 1999.

Turner-Rahman, Greg. 'Sharing Styles: New Media, Creative Communities and the Evidence of an Open Source Design Movement', *The Fibreculture Journal, Distributed Aesthetics Issue*, 7. 2005.

Virno, Paolo. *A Grammar of the Multitude*. Semiotext(e), 2002.

Weber, Steven. *The Success of Open Source*. Massachusetts: Harvard University Press, 2004.

Zawinski, Jamie. 'Resignation and Postmortem' 1999, <http://www.jwz.org/gruntle/nomo.html>



The LOCKSS System has the permission to collect, preserve and serve this open access Archival Unit



The Fibreculture Journal is published under a Creative Commons, By Attribution-Non Commercial-No Derivative licence.



OPEN HUMANITIES PRESS

The Fibreculture Journal is an Open Humanities Press Journal.