

**DATA browser 02**

# **Engineering Culture**

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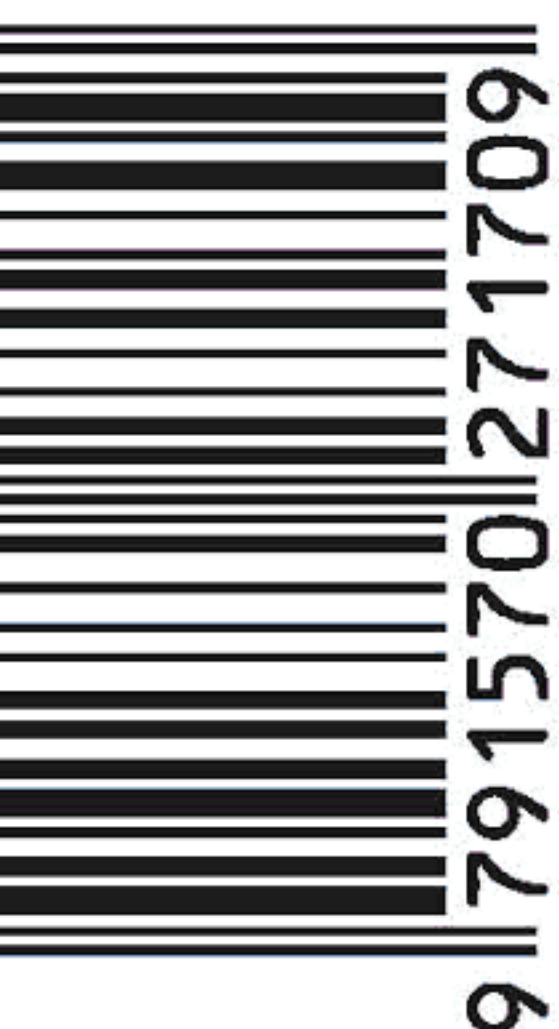
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ENGINEERING CULTURE: ON 'THE AUTHOR AS (DIGITAL) PRODUCER'

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# **ENGINEERING CULTURE:**

## **ON 'THE AUTHOR AS (DIGITAL) PRODUCER'**

DATA browser 02  
AUTONOMEDIA

# INTRODUCTION TO 'THE AUTHOR AS (DIGITAL) PRODUCER'

Geoff Cox & Joasia Krysa

- + 'An author who has carefully thought about the conditions of production today [...] will never be concerned with the products alone, but always, at the same time, with the means of production. In other words, his [/her] products must possess an organising function besides and before their character as finished works.' (Benjamin 1983: 98)

Social change does not simply result from resistance to the existing set of conditions but from adapting and transforming the technical apparatus itself. Walter Benjamin in his essay 'The Author as Producer' (written in 1934) recommends that the 'cultural producer' intervene in the production process, in order to transform the apparatus in the manner of an engineer. This collection of essays and examples of contemporary cultural practices (the second in the *DATA browser* series) asks if this general line of thinking retains relevance for cultural production at this point in time - when activities of production, consumption and circulation operate through complex global networks served by information technologies. In the 1930s, under particular conditions and against the backdrop of fascism, a certain political optimism made social change seem more possible.<sup>1</sup> Can this optimism be maintained when technology operates in the service of capital in ever more insidious ways?

In referring to the activity of 'engineering', the term 'engineer' is to be taken broadly to refer to technical *and* cultural activity, through the application of



knowledge for the management, control and use of power. To act as an engineer in this sense, is to use power productively to bring about change and for public utility. In this, the traditional mechanical or electrical (hardware) engineer is evoked, but also the software engineer or software artist. Admittedly, there is little new in this; cultural production and engineering have been brought together in various ways – from the ‘sci-art’ work of Leonardo da Vinci to the ‘experiments in art and technology’ (EAT) involving the engineer Billy Klüver, working with John Cage and Robert Rauschenberg amongst others.<sup>2</sup> However, *Engineering Culture* attempts to draw together technical and cultural activity with the added desire for social change (invoking social engineering). It is important to strike a distance here from the popular view of engineering practice as merely a technical service industry: what The Institute for Applied Autonomy (IAA) herein call ‘the tendency to myopically focus on technical problems and leave consideration of a product’s ultimate use to marketers and end-users’ (pp. 95-105). Clearly the aim is to evoke a less instrumental view of technology, that engages with the ethical and social implications of techno-cultural production in the material world. In the context of socially-engaged cultural practices of the 1930s, Benjamin stresses the counter-point that it is simply not enough for cultural producers to demonstrate political commitment without at the same time thinking through its relationship to the means of production and the technical apparatus. This is not to be interpreted as a preference for form over content, but a collapsing of the distinction between the two. For Benjamin (and Marxists in general), only in this way - through an engagement with the means of production and in turn the relations of production - can social change be made a possibility. This publication asks if this still holds, and if so, in what new forms?

On the surface, it seems that much contemporary techno-cultural practice operates in the spirit of Benjamin’s essay, opposing the simplistic separation of theory and activism. Moreover (as we explored in *Economising Culture*, DATA browser 01), the separation of theorist and activist (and we might add ‘artist’ - although clearly there are difficulties with the term) makes no sense in an overall practice of cultural production that takes account of the cultural aspects

of economics and the economic aspects of culture. Clearly, the conditions and means of production have changed enormously since the 1930s. Capitalism has undergone dramatic transformations, characterised by flexibility, decentralisation and networking but there are also lines of continuity:

'The rise of the network society [...] cannot be understood without the interaction between these two relatively autonomous trends: development of new information technologies, and the old society's attempt to retool itself by using the power of technology to serve the technology of power' (Castells 1996: 52).

In much recent criticism addressing 'new' technologies, there is far too crude a distinction between industrial and post-industrial economies. In contrast, Manuel Castells, in *The Rise of the Network Society* (1996) describes the current technological mode as discontinuous from the industrial mode but its overall logic is continuous in serving power. The distinction (or alleged paradigm shift) that Castells points to, is the change in the ways technological processes are organised - from a mode of development focussed on economic growth and surplus-value (industrialism) to one based on the pursuit of knowledge and increased levels of complexity of information (informationalism). This publication aims to ask what new strategies might be appropriate, given these changes and the new emphasis on the production of knowledge and culture, rather than wealth. There may be discontinuities in terms of technological mode, but the site of production is still where inequalities are identified and where exploitative conditions might be reverse-engineered.<sup>3</sup>

Taking its cue from the opening Benjamin quote, this introduction firstly describes the changed material conditions of production that now concentrate on knowledge and information, and how labour has been reconceived as 'immaterial' (to characterise the way networked technologies materialise 'general intellect'). Consequently, some of the tensions over the proprietary ownership of ideas emerge that underpin creative strategies for engaging with the technical apparatus that is inherently collective and shared. In Benjamin's terms, cultural

production must be inserted into the context of lived social relations determined by production relations - and the cultural producer is required to act like an engineer accordingly. The contributions to this publication take this statement as a point of departure.

### **Upgraded technical apparatus**

The logic of the network defines a new industrial space in contrast with the historically created institutions and organisations of industrial society, in which technological and organisational factors combine to make production flexible, able to produce goods across different locations but unified through networked communications technology. This is the 'post-industrial factory', defined not by a fixed site but by the network between multiple sites. Like a factory, the separate units are defined by the processes and labour required for the component parts of the overall operation. Networked communication technologies have contributed to this in requiring a highly skilled technological labour force on the one hand, and relatively unskilled assembly work on the other. Often this simply reflects the patronising terminology of the 'developed' and 'developing' world, in what Castells calls an international spatial division of labour, based on cheap labour costs, tax waivers and lack of environmental constraints, under the ruling ideology of neo-liberal globalisation (1996: 387).<sup>4</sup> With information technology, automation appears to have come of age, and 'developed' labour is transformed by the need for the required knowledge to operate it, offering new relational patterns in the performing of work. The increasingly immaterial form of social relations, communications networks and information systems has also been extended to the new type of production of 'immaterial goods' and - to use Maurizio Lazzarato's term - cast as 'immaterial labour' (1996). This can partly be recognised in relation to the computer, in the way it has redefined labour as well as the social relations that sustain Capital. Correspondingly, the argument follows that new forms of resistance are made possible by an understanding of these immaterial processes and apparatuses.

The continued significance of 'The Author as Producer' essay lies in requiring

the author or cultural producer to act as an active agent, to intervene in the production process and property relations; to transform the apparatus. This is the 'organising function' that Benjamin proposes, demanding the author reflect upon the production process - setting the laboratory in opposition to the finished work of art (or commodity form). If this now sounds like an orthodoxy in contemporary cultural practice, the crucial aspect for this argument is what Gabriel Tarde (in 1902) called 'truth-value' to theorise the production of culture and knowledge, and to undermine the traditional analysis of the political economy (Lazzarato 1999). Rather than concentrating on use-value, he introduced the idea of 'truth-value' because knowledge is the result of a process of production that produces value. However, unlike other products, knowledge is a mode of production that cannot simply be reduced to the market or through exchange without distorting its production and consumption value (1999: 160). His example is the production of books, in which the exchange value of a book can be determined by the market as a product but not as knowledge, which is more determined by moral issues of gift or theft (1999: 162). This publication might similarly be considered in such terms through its use of open license agreements and its contents freely downloadable from the internet. On the other hand, Capital desperately tries to treat knowledge as it does any other goods. It 'makes material the culture of the informational/global economy; it transforms signals into commodities by processing knowledge' (Castells 1996: 172). In Lazzarato's terms, Capital is obliged to turn 'immaterial products' into 'material products' to protect its logic - the logic of the 'immaterial economy', to use his term for the informational economy. Relations of power extend beyond the market in this way. If Capital appropriates knowledge and culture for its purpose, then its opposition must attempt to use knowledge and culture to influence the economy at the level of the *apparatus*.

Undoubtedly critical work on the nature of digital culture requires continual upgrade - proposing 'technical innovation and revolutionary use-value over mere modishness' as Benjamin puts it - in contrast to the 'naïve optimism' of much new media practice. He further stresses that it is simply not enough for a

producer to have political commitment, however radical it may seem, ‘without at the same time being able to think through in a really revolutionary way the question of their own work, its relationship to the means of production and its technique’ (1983: 91). The problem of course, then and now, is that technical innovation and social engagement happen all the time but without putting relations of power into serious question. So what about the technical apparatus in contemporary terms of the knowledge and information economy?

A closer look at the contemporary operating system or apparatus highlights some contradictory tendencies in this respect. For example, in ‘The Macintosh Computer: Archetypal Capitalist Machine?’ (reprinted here with a new afterword, pp. 39-61), William Bowles argues that these tendencies of the capitalist system are not only enhanced by the development of new technologies but also expressed through the technological tools themselves. For Bowles (first writing in 1987), the Macintosh computer in particular represents a further development of what he describes as a ‘general tool’ for ‘generalised education’ in that it is designed to be easy to operate - to be ‘user-friendly’. Despite surface appearances, however, the underlying processes are decidedly complex and there is a vast amount of expertise invested in the operating system. The operating system “masks” the “real” operation of the computer by interposing itself between the user and the Central Processing Unit’ and thus the Macintosh computer presents itself as a ‘black box’, denying access to its depths (to use a term from cybernetics). This is also symptomatic of current conditions of production, and arguably can be extended to describe wider mechanisms of knowledge production (through research and education) in the network society. The historical parallel of the introduction of new technologies can be traced to the beginnings of the industrial period, not least in the introduction of machine tools that transfer skills from the human to the machine itself, reflecting a trend that alienates the worker/user from the very processes they are involved in. For Bowles, this is entirely expected:

‘What we are seeing is then an exact duplication of the first industrial revolution where craft skills were stolen and locked into the industrial machine, then



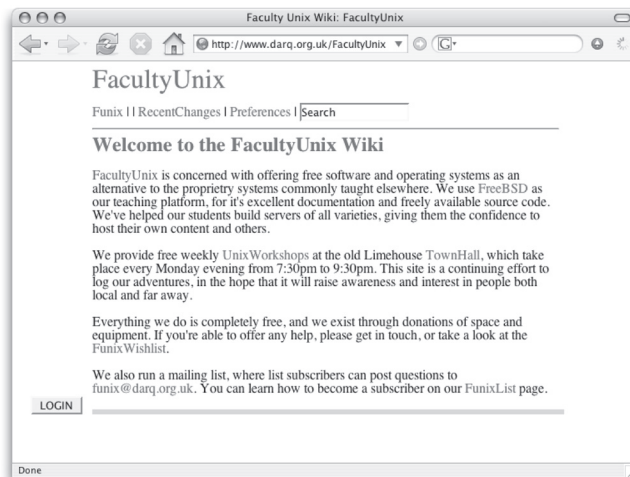
perfected to the point whereby general principles could be extracted and applied to ever more sophisticated machines, each in turn, requiring less and less skill (and labour) to operate!

### **Reconceived forms of labour**

Microsoft, the symbolic target of most negative attention in this field, provides opportunities for 'contingency workers' or 'temp slaves', as part of a 'disposable labour force'. Naomi Klein claims Microsoft 'wrote the operating manual' for this approach, 'engineering the perfect employee-less corporation' (2001: 249). Labour, including creative labour, is transformed by the need for the required knowledge to operate information technology, offering new relational patterns in the performing of tasks ('immaterial labour') and offering new patterns of exploitation. The phrase 'precarious labour' has become increasingly popular to describe intermittent and irregular work that 'teeters' on the edge of moral acceptability and the ability to generate a living wage. Flexibility in employment patterns necessitated by capitalist exploitation has created precarious conditions for workers, unions and perhaps even capitalism. For Marina Vishmidt, 'precariousness' stands for the 'ideological poverty of capital's subjectification, and hopefully, the site for a broadly-based contestation of its effects' (2005: 93). The 'immanence' in capitalism (that still contains the seeds of its own destruction) is based on the connection between the production of new subjectivities, the refusal to work, and the recomposition of workers as a class - related to the concept of 'immaterial labour'. In this scenario, the information worker is conflated with artist performing 'creative labour'; as Tarde says, 'artistic labour is productive labour' (Lazzarato 1999: 165). To Vishmidt, there is a danger in perpetuating the dogma of art or creativity, as well as the problem with the generality of the term immaterial labour, excluding certain forms of labour from the analysis, such as domestic work (2005: 94). Castells makes the distinction between the 'networkers' who set up connections on their initiative, and the 'networked' who are online but without any control over decisions; and another category of the 'switched-off', who are tied to tasks and operate through non-interactive, one-way instructions (1996: 244). For Lazzarato, the significance of this in terms

of intellectual production, ‘is in the process of becoming a new “contradiction” within the information economy, for which the challenges represented today by the internet are but the premises of opposition to come’ (1999: 163). However characterised, labour is still crucial for the identification of exploitation.

Elsewhere Tiziana Terranova argues that the complexity of labour in the digital economy is characterised by ‘free labour’ invested in the production of free and open source software (2000: 33). Drawing upon the idea of immaterial labour, she argues that there is a material foundation that structures the cultural and economic flows of the network society, reflecting free market principles. The contradictions over free labour are explained, for Terranova, not as an alternative to capitalism as such but as new forms of labour that ‘developed in relation to the expansion of the cultural industries and are part of a process of economic experimentation with the creation of monetary value out of knowledge/culture/affect’ (2000: 38). Clearly the knowledge to make free software is not free either. Although in some ways the Macintosh operating system’s current Unix-based form (of OSX) makes it possible to work at a deeper level of operation through the command line interface (terminal), this is only the case if you have the knowledge and skills to do so. Such knowledge should be common property.



With this in mind, the University of Openness is an organisation that offers itself as a 'self-institution' for independent research, collaboration and learning.<sup>5</sup> Its Faculty of Unix is particularly interesting in this connection, offering free workshops as an alternative to proprietary systems and learning models elsewhere. This demonstrates the potential of open source knowledge as opposed to the ways in which conventional operating systems try to hide their complexity and hence limit the transformative possibilities.

In words that echo Lawrence Lessig's ideas in *Free Culture* (2004), that 'big media uses technology and the law to lock down culture and control creativity', Bowles's upgraded essay ends with the following statement: 'If the idea of the knowledge worker is to be made a reality then it requires that we recognise that intellectual capital is not the proprietary ownership of ideas but the creative mind unleashed'. Rather than 'closing the source code', open source cultural practices necessarily stress the collective nature of creative and intellectual production - something that the concept 'general intellect' alludes to. 'General intellect' has become immensely important in discussions around contemporary forms of collective protest - especially in the work of Negri and Lazzarato, and herein in the contribution by Nick Dyer-Witheford (pp. 71-93) - as an extension of what the autonomists call a 'social factory'. The original source of the term is a section in the *Grundrisse* (1981) entitled 'Fragment on Machines', in which Marx describes that at a certain point in capitalist development, real wealth will be measured not on labour time in production but on technological expertise and organisation.<sup>6</sup> It prefigures networked communications technologies, human-machine subjectivities and their importance for the restructuring of capital. The critical argument, in Marx, is that the general intellect unleashes contradictions by combining scientific knowledge and social cooperation. Firstly, as less and less labour is needed, capitalism undermines its very social order that is based on class exploitation. Secondly, the increasingly social nature of labour undermines private ownership and systems of wage payment. Through the concept of general intellect, capital can be seen to be setting the conditions for its collapse. In this context Negri and Lazzarato conclude that capital appears

to have successfully contained this ‘mass intellectuality’ within its structures by the complex management and control of knowledge. Therefore new forms of protest derive from this limited access to and exclusion from what should be generally available. It is easy to see evidence of this, for instance in antagonisms over intellectual property in the network society.

### **Engineered creativity**

New antagonisms can also be seen in new management techniques that appear to place value on creativity and enterprise in the ‘knowledge-for-profit economy’.<sup>7</sup> This is evident in the context of higher education as one of many sites of market-driven economic expansion, tied to the development of high-technology industries. In ‘Cognitive Capitalism and the Contested Campus’, Nick Dyer-Witheford introduces the term ‘cognitive capitalism’ to describe the commercial appropriation of general intellect:

‘Universities are now frankly conceived and funded by policy elites as research facilities and training grounds for the creation of the new intellectual properties and technocultural subjectivities necessary to post-Fordist accumulation regime’.

In this manner, etoy’s satiric ‘day-care activities’ project (pp. 31-37) involves education and genetics specialists setting out to ‘configure the future of digital art’ by converting children into data-packages, ‘providing them with an entry point into art production, identity design and electronic authorship’ to engineer a ‘subversive identity-extension’. Such a blatant example of bio-tech engineering a designer subjectivity stands in contrast to former levels of academic autonomy and the university’s role as a site of contestation and liberal (sometimes even radical) thinking.

In the University, the reorganisation of labour creates new relations between dissenting academics and oppositional social groups. Dyer-Witheford is here drawing upon Lazzarato and Negri in arguing that the closer relation of universities to capitalism produces a more effective opposition from within to

the ways in which 'general intellect' has been appropriated. Rather than act from some lofty position, academics are forced into a position of solidarity with other workers. Similarly, an increasing student population has become part of 'immaterial labour' and subject to forms of exploitation - rekindling Marcuse's statement that students are the new proletariat. Students are often caught in living/working contradictions: 'as subjects of disciplined preparation for privileged managerial responsibility, [and simultaneously] as subservient and badly-paid service workers'. These conditions shift contestation from the factories to the campus, argues Dyer-Witheford. The challenge for intellectuals, and those working in Universities, is to engage in the public sphere without simply falling into the research and enterprise culture of capitalist renewal. Necessarily as universities concentrate their energies on engineering and technology disciplines, forms of dissent to capitalism correspondingly employ the same tools in response to its control over the means of production. In this way, The Institute for Applied Autonomy (IAA), in 'Engaging Ambivalence', describe their use of the 'visual and rhetorical devices of sanctioned research organisations to infiltrate engineering culture', initiating projects that are presented as 'research findings'. In particular, IAA explores 'expressive opportunities afforded by appropriating the tools, techniques, and terminologies of the military-industrial complex'. They concentrate on the 'engineering research' of the US Department of Defence and its Defence Advanced Research Projects Agency (DARPA), exposing the transfer of funds from military to academic and corporate research labs in exchange for technological innovations for military purposes. This reveals the tensions between military and academic approaches to knowledge production under the disguise of 'cultural co-production':

'The ambivalence embodied in these contradictory formulations of engineering practice is enabled by a conception of technology as value-neutral tool that, by extension insists technological development is an ethically indifferent activity. This instrumental view of technology and ambivalence towards the world are normalised through immersion in engineering culture - primary in technical universities'.



In the UK, the military sector also plays a disproportionate role in setting the research agenda for science and engineering - according to a recent report 'Soldiers in the Laboratory' published by Scientists for Global Responsibility (Radford 2005). Like the US, this is a trend on the increase, with plans in the UK to boost spending on high-technology military capacity over the next five years currently standing at 30% of the overall public research and development budget and with the Ministry of Defence employing 40% of all government researchers.<sup>8</sup> The special relationship between the UK and US runs deep and reveals: 'a new military-industrial complex of the 21st century - military-led funding of exotic technologies and hi-tech weaponry rather than technology to address pressing social needs' (Radford 2005; quoting Philip Webber, Chairman of Scientists for Global Responsibility). At the heart of this, is the link between weapons development and arms sales, informing the agendas of innovation - from space orbital technologies during the cold war to new missile technologies and the recent interest in nanotechnology and 'smart' materials. One might speculate on future threats dreamt up by appropriately named 'think tanks'.

These tendencies are further emphasised in the merger of academic and corporate interests encapsulated by the growth of research parks, private sector consultancies and the emphasis on enterprise or what is now called 'innovation' (at least in the University where we work). Dyer-Witheford also points to the changes in intellectual property laws that enable Universities to exert ownership over patents, granting them commercial incentives for particular kinds of research activity. In this respect, visibility and accountability are directly addressed in the Bureau of Inverse Technology (BIT)'s project *bit plane* (pp. 63-68), a radio controlled model airplane equipped with a micro-video camera and transmitter launched over no-camera zones of the corporate research parks in Silicon Valley - the largest concentration of venture capital in the world. Corporations under *bit plane*'s flight path included Apple, IBM, Lockheed, Dolby, Intel, Netscape, Sega, Oracle, Yahoo, SGI, Adobe, Atari, Compaq, Sun, 3Com. Here, issues around intellectual property, information as property and information control are seen to be crucial:

'The traditional view of photography, evidence and information reinforces a definition of information as property - and therefore that property laws can hold. The Bureau holds that information doesn't in fact exist or circulate in those sorts of forms.'

### **Digital Producer**

For Benjamin, the progressive writer or cultural producer acknowledges the choice of in whose service, or more particularly class interests, the writing (artwork) operates. As a result, he argues that for a work to be 'politically correct', it must simultaneously be correct in the literary or artistic sense. The first principle he establishes is that the work is not autonomous in itself and according to materialist criticism must be inserted into the context of 'living social relations', themselves determined by production relations. Instead of making the usual opposition of whether a work is reactionary or revolutionary, he simply asks: what is its position *within* the production relations of its time - and this for him is a question of 'technique', combining skill and technology. He cites the Russian writer Tretyakov who as an 'operative' writer typifies suitable technique and lies outside the established canon of literary forms as a journalist. The argument follows that the category of literature should evolve according to the energy of the time and include new forms and confusions - employing the new technology of the time.

More recently in *Writing Machines*, N. Katherine Hayles stresses the importance of materiality in describing the many agents of production: 'The engineers who design these machines, the factory workers who build them, the software designers who write programs for them, and the technicians who install and maintain them...' (2002: 6). She adds the materiality of the text itself to the analysis, in a similar way to those in the software critical community who consider code to be material (in addition to hardware). In this way, it is the materiality of writing itself that is expressed through the relationship between natural language and code - one tended towards free form and expression, the other towards control and precision. It is the interplay between the two modes

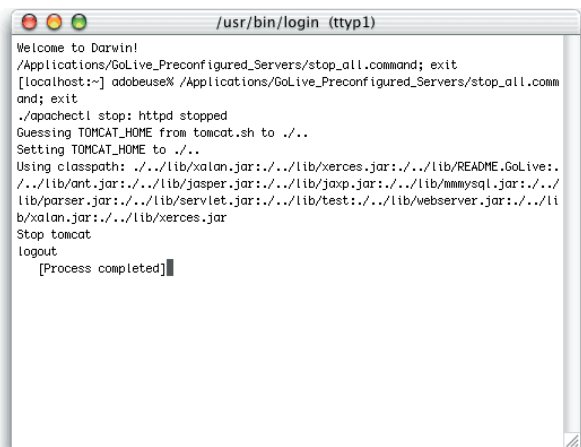
that is of concern for Hayles's materialist position. What she calls a 'technotext' brings into view the technical apparatus or writing machine that produces it. The materiality therefore requires attention to the technical apparatus, but also to the program - the activity of programming and the activity of the program once executed.

The materiality of text or code is further verified by the property rights exerted on it. Examining the Free Software Movement and Net Art, Josephine Berry Slater in 'Bare Code' (pp. 133-149), sees the practice of hiding the source code as narrowing its creative potential, and enforcing a series of mythologies around creativity and property rights. Conversely, there are more radical examples than mere arts practice as such. She cites the award of a prize to the GNU/Linux operating system at the *Ars Electronica* festival in 1999, and sees this as not only the 'Duchampian gesture of nominating a tool of production as a work of art', but also a classic example of the analogy between avant-garde art and free software in challenging myths concerning creative production. These issues relate to the collective nature of free software production but also to the breakdown of firm distinctions between producers and consumers. The individual artist, even software artist, might be 'compared to the capitalist who harnesses and thus alienates proletarian labour power into surplus value'. For Berry Slater, the overt reference to Benjamin's 'The Author as Producer' essay confirms an engagement with code as material and the relations of production that are expressed in the shared production of free software in the context of the informational economy. This allows her to question that if: 'net artists use proprietary software to produce their work, to what extent can they be said to be transforming the apparatus of production?' Not very much of course. Accordingly, she concludes: 'A radical realisation of art, then, would be the deposition of the sovereign producer and a return of the shared wealth of creativity to its true owners: the multitude. For this reason, a reappropriation and transformation of the artistic means of production comes to the fore - an opening up of cultural source codes to an undetermined end.'

The opening up of source code and the apparatus in general allows new forms of practice to emerge. Benjamin's example of this regenerative process is the newspaper, as it throws into question a number of established separations - of academic and popular modes, of descriptive and creative writing, but perhaps most particularly the separation between writer and reader:

'For as literature gains in breadth what it loses in depth, so the distinction between author and public, which the bourgeois press maintains by artificial means, is beginning to disappear in the Soviet press. The reader is always prepared to become a writer, in the sense of being one who describes or prescribes. As an expert - not in any particular trade, perhaps, but anyway an expert on the subject of the job he happens to be in - [s]he gains access to authorship. Work itself puts in a word. And writing about work makes up part of the skill necessary to perform it. Authority to write is no longer founded in a specialist training but in a polytechnical one, and so becomes common property.' (1983: 90).

Elsewhere drawing upon the work of Roland Barthes, Florian Cramer makes the distinction between 'readerly' and 'writerly' texts and applies this to operating systems (2003). Rather than the readerly properties of a GUI (Graphical User Interface) operating system that encourages consumption, the command-line operating system of Unix is seen as writerly, in terms of its openness and in



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Welcome to Darwin!
/Applications/GoLive_Preconfigured_Servers/stop_all.command; exit
[localhost:~] adobeuse% /Applications/GoLive_Preconfigured_Servers/stop_all.com
and; exit
./apachectl stop: httpd stopped
Guessing TOMCAT_HOME from tomcat.sh to ../
Setting TOMCAT_HOME to ../
Using classpath: ../lib/xalan.jar:../lib/xerces.jar:../lib/README.GoLive:..
../lib/ant.jar:../lib/jasper.jar:../lib/jaxp.jar:../lib/mm.mysql.jar:../li
lib/parser.jar:../lib/servlet.jar:../lib/test:../lib/webserver.jar:../lib
b/xalan.jar:../lib/xerces.jar
Stop tomcat
logout
[Process completed]

```

encouraging the reader to become a producer of text (such as is possible if one was to take a free workshop at the Faculty of Unix). This is important for Cramer, as it breaks down the false distinction between the writing and the tool with which the writing is produced, and in terms of the computer, between code and data. It is almost as if GUI software disguises itself as hardware (2003: 101), using crude and patronising analogies like desktops with the classical Macintosh interface. On the other hand, the Unix command line holds multiple possibilities for transformation and manipulation - combining instruction code and conventional written language - into 'operative' forms.

The functional relationship between text (and this can be extended to include code in the current context) and production is exemplified for Benjamin through the opposition of 'the dramatic laboratory to the finished work of art' (1983: 100). The model of cultural production proposed is to regard the product as a process equipped with an instructive or educational function and providing an improved apparatus. In 'The Process is the Product' (pp. 127-131), Redundant Technology Initiative takes an ecological approach and proposes to transgress existing mechanisms of the over-production of technology, changing consumption patterns from the use of open source software to recycling old hardware, and then training people to use it. Such practices emphasise the collaborative nature of cultural production and collective work, undermining the orthodox relationship between producer and consumer. Indeed many of the contributions to this volume use 'Wikis': a collaborative authoring system for hyperlinked documents on the web.<sup>9</sup> 'George's Wiki' (pp. 106-109) is a filtered list of appropriated consumer technologies. User modifications reveal some of the cultural contradictions, in as much as they appear to undermine the intended consumer and producer distinction and at the same time emphasise the speed and sophistication of recuperation. The Wiki, both in terms of form and content is offered for continual update and will eventually inform a series of proposed workshops. As Benjamin notes, cultural production requires a pedagogic function. It must have the function of a model, turning consumers and readers alike into collaborators:



'The crucial point, therefore, is that a writer's production must have the character of a model: it must be able to instruct other writers in their production and, secondly it must be able to place an improved apparatus at their disposal. This apparatus will be the better, the more consumers it brings in contact with the production process - in short, the more readers or spectators it turns into collaborators.' (1983: 98)

The 'prosumer' characterises this breakdown of the distinction between producer and consumer, that has become an orthodoxy of the global communications apparatus. This is what Pit Schultz characterises as 'The Producer as Power User' (pp. 111-125) - both 'consuming power and being consumed by it'. In this way, a power user is distinguished from an average user by the depth of knowledge of the technical apparatus, such as using Unix or calculating machines at a level of complexity: 'Driven by the will to knowledge, the power user will ultimately empower herself by giving knowledge away. The more intellectual property is collectified, the more sources are open, the more of a critical mass of free knowledge becomes possible'.

Rather than the linguistic aspects of software production, Matthew Fuller in 'Freaks of Number' (pp. 161-175) is keen to historicise this in terms of calculation, and sees Maurice d'Ocagne's 'Le Calcul Simplifié par les Procédés Mécaniques et Graphiques' (1893) as an early example of computer criticism. To Fuller, the standardisation of objects typical of industrial production follows this same numerical logic. In conventional culture, it is almost as if programmers exhibit a numerical disorder in following this logic. Software art in this sense is a mechanism for a reverse tendency, a critical means for the exploration of how software propagates the standard object. He says:

'On the scale of numbers, post-industrial society is perhaps something that occurs when the 'avalanche of numbers' of Hacking, an enormous and self-generating torrent of factualisation, tabulation and recording meshes with numericalised labour, mechanisation and product and informational standardisation and variation.'

To Fuller, mainstream computing is locked into a ‘neo-Platonism’ that finds aesthetic value in the most simple, pure form of a solution to a given problem. By way of contrast is the playfulness of Harwood’s *London.pl* (reproduced in this publication, pp. 151-158) based on, or rather plagiarising, William Blake’s poem *London* written in the last decade of the eighteenth century. Here, in both works, statistics and the modulation of populations are used for social comment. In the Harwood version, arguably, the contemporary ‘arithmetico-material’ conditions are doubly registered both in content and form. For instance, one line of the program comments reads: ‘# Find and calculate the gross lung-capacity of the children screaming from 1792 to the present’.

An activity like hacking perhaps offers some hope and, at least in potential, allows for the synthesis of commitment and quality that Benjamin proposes. McKenzie Wark would argue that information is kept in chains, and continues to focus attention on the central importance of property relations and the activity of hacking as ‘the production of production’ (in *A Hacker’s Manifesto*, 2004). To the programmer Jaromil, this sentiment is expressed in what he calls Babylon’s insistence on proprietary models of ownership as a form of slavery, racism and oppression (pp. 203-206). He positions his ‘Rasta Software’ in opposition to this, taking inspiration from Rasta culture as analogous to GNU free software principles. Extending this argument in ‘Roots Culture - Free Software Vibrations Inna Babylon’ (pp. 177-201), Armin Medosch draws an analogy between Rasta’s critique of the power structures, the class system and knowledge system (of Babylon) and the ways in which Free, Libre, Open-Source Software (FLOSS) was adopted by programmers as a critique of the corporate world. Unlike Rasta culture, however, he argues that rather than rooting alternative practices in communities, FLOSS can be seen to be detached from its ‘roots’ unless it is placed within a culture (citing positive examples that infuse culture into software - such as Jaromil and Harwood). This is where the distinction between open source and free software is important as a critique of power structures. Medosch explains that the distinction was made by Richard Stallman not on a technical level but on an ideological one in that:

'free software is linked with a political concept of freedom centred around freedom of speech; whereas open source is linked with pro-business computer libertarians and the idea of releasing source code and developing software collaboratively appealed to business like IBM or Sun as a potential antidote to the market dominance of Microsoft'. In this sense, open source is the embodiment of pure engineering, in contrast to free software as technical and cultural engineering. This publication aims to emphasise this distinction.

Resistance to market forces, argue Raqs Media Collective in 'X Notes on Practice' (pp. 209-227), lies in the domain of the 'artisan'<sup>10</sup> who: 'mediates the transfiguration of people into skills, of lives into working lives, into variable capital'. Increasingly, and under the conditions of an economy based on intellectual property and immaterial labour, the distinction between worker and artist breaks down, and the value they produce becomes standardised. The 'worker as artist', or 'author as producer', now labours in a scenario where information and communication dominate the process of production. In this sense all workers operate like artists in producing meanings and knowledge. For instance, Raqs suggest the call centre worker of globalised corporate capitalism displays 'imaginative skill, and a combination of knowledge, articulateness, technological dexterity and performativity'. The radical artist is thus required to engage with the production of knowledge and intellectual property - what Raqs call:

'the protocols of networked conversation [...] across sites, across different histories of locatedness in the network; to invent protocols of resource building and sharing, create structures within structures and networks within networks'.

The issue for Raqs is how workers (or artists) can recuperate a sense of agency and human dignity in the face of migrant labour, exploitative practices in free trade zones and contemporary forms of slavery as symptoms of the logic of capitalism. How might we imagine and implement new economic models based on self-regulation and free exchange 'outside the circuit desired by capital' (such as the example of factory workers in Buenos Aires). They ask: 'how might we

begin to consider and understand the global figures of the alien, the encroacher, the pirate, the hacker and the worker defending their machine?’ In this scenario, the author as digital producer is empowered by their ability to engineer an alternative culture.

This is what Benjamin proposes as an engagement with the technical apparatus at a deep level of understanding. Can we begin to see that conventional interfaces and operating systems cut the majority of users off from a deep understanding of what is actually taking place, and stops them from becoming active cultural producers? Might this be the purpose of cultural practice, to reveal these tendencies - to actively engage with the technical apparatus to elicit social change and challenge proprietary models? To engineer change and to believe in the possibility of social transformation, it remains necessary to transform the cultural producer ‘from a supplier of the production apparatus, into an engineer who sees his task in adapting that apparatus’ (1983: 102).

5

**NOTES:**

*This publication has been partly informed by the 'Artist as Engineer' symposium (University of Plymouth 2003) as part of 'Interrupt: artists in socially-engaged practice', a series of five symposia initiated by the Visual Arts department at Arts Council England.*

*Vivienne Reiss, 'Interrupt' co-director, Senior Visual Arts Officer, Arts Council England, writes: 'Socially engaged, collaborative and situated art practices have a substantial history often formed by artists stepping outside the various institutional frameworks of commissioning, exhibiting and critiquing contemporary visual art. These artists often work with initiatives which have specific educational and social agendas and outcomes. 'Interrupt' was a collaboration with a number of galleries and higher education institutions. The aim was to stimulate discussion around the central question: Where does socially-engaged, participatory and education arts activity stand within current debates around contemporary arts practice? Interrupt brought together artists, educators, curators, producers, cultural theorists and commentators to explore the diversity of approaches, and to describe and contest this field of practice.'*

*For more information visit the 'Interrupt' web site <<http://www.interrupt-symposia.org>>.*

1. 'The Author as Producer' was first written as a lecture for the Institute for the Study of Fascism, in Paris, April 1934. Over the years, the essay has been extensively reworked as the opposition of theory versus activism - reproduced in full as the first chapter of Victor Burgin's *Thinking Photography* (first published in 1982), and more recently reinscribed by Hal Foster as 'The Artist as Ethnographer' in *The Return of the Real* (1996).

2. Of particular interest is Klüver's collaboration with Robert Rauschenberg, *9 Evenings: Theatre and Engineering*, which incorporated new technology developed by 10 artists working with more than 30 Bell Labs engineers.

3. Hardt and Negri more recently remain convinced that the realm of production is still where 'social inequalities are clearly revealed and, moreover, where the most effective resistances and alternatives' arise (2000: xvii). The subject of labour as agents of change, fall under new conditions of production, that continues to separate the producer from the means of production and thus creates class conflict.

4. Class conflict has gone global, in other words. It should also be said that this describes a general tendency, but the forms vary according to local specificities. In this publication, Raqs Media Collective explore some of these issues in the context of India as a rising economy based, upon knowledge accumulation and access to technology.

5. The University of Openness is a framework in which individuals and organisations can pursue their shared interest in emerging forms of cultural production and start a faculty to socialise their research <<http://twentiethcentury.com/uo/index.php>>. The Faculty of Unix offers free weekly Unix classes since 2002 <<http://darq.org.uk/FacultyUnix>>.

6. The crucial element will be the 'general powers of the human head', 'general social knowledge', 'social intellect' owing to the increasing power of the importance of machinery (Dyer-Witheford 1999: 220; quoting Marx directly). The productive forces of the intellect, of human knowledge and skills are incorporated into capital itself. At the time, Marx was thinking of the increasing importance of automatic systems for production and the networks of its communication, the world market.

7. Lazzarato even thinks these new techniques are more totalitarian than the production line, as it deludes the worker into thinking they are an active participant in the process (1999: 224). As with interactive art, participation, whether through teamwork in the workplace or over global communications networks is thoroughly contradictory, according to Lazzarato. As a result, conflict arises between capital's objective control and the relatively autonomous subjective nature of the work. The intellectual and creative activity of hacking is a prime example of the contradiction at



the heart of capital's attempt at control, as it is both a necessary skill and criminalised when it is out of control.

8. The UK is the third largest military spender, and the second largest spender on military science, engineering and technology. It is easy to guess which country is the first largest spender on 'weapons of mass destruction'.

9. George's wiki herein uses PmWiki, a WikiWikiWeb system developed by Patrick Michaud in the PHP scripting language. The software is freely available under the GNU Public License and may be downloaded from <<http://www.pmichaud.com/pub/pmwiki>>.

10. Richard Barbrook and Pit Schultz in their 'Digital Artisans Manifesto' (1997), reject the idea that the Internet is the final stage of alienating effects of machines, and instead emphasise the centrality of autonomous and creative labour in this process as the force of historical change: 'We will transform the machines of domination into the technologies of liberation'. It is argued that this transformation can come about by rejecting neo-liberal work patterns of the free market, the 'californian ideology' and formation of a 'virtual class'. Instead they propose the digital artisan, in which autonomous work is made possible in the manner of past craft workers 'able to assert their autonomy precisely within the most technologically advanced industries' (1997).

## REFERENCES:

Richard Barbrook & Pit Schultz (1997), 'The Digital Artisans Manifesto', <<http://www.hrc.wmin.ac.uk/hrc/theory/digitalartisans/t.1.1.html>>.

Walter Benjamin (1983) 'The Author as Producer', in Understanding Brecht, trans. Anna Bostock, London: Verso. A more recent translation is available in Michael W. Jennings (ed.), (1999) Walter Benjamin: Selected Writings, Volume 2 1927-1934, trans. Rodney Livingstone et al, Cambridge, Mass. & London: Belknap Press of Harvard University, pp. 768-782.

William Bowles (1990) 'The Macintosh Computer: Archetypal Capitalist Machine?' (1987) Retrofuturism 13, <<http://psrf.detritus.net/r/13/index.html>>.

Manuel Castells (1996) The Rise of the Network Society, Oxford: Blackwell.

Florian Cramer (2003) 'Executable statements: the Insistence of Code', in Gerfried Stocker & Christine Schöpf (eds.) Code - The Language of Our Time, Ars Electronica, Linz: Hatje Cantz.

Geoff Cox & Joasia Krysa (2004) 'Art as Engineering: Techno-art Collectives and Social Change', Art Inquiry, Lodzkie Towarzystwo Naukowe, Lodz, Poland.

Geoff Cox & Joasia Krysa (2005) 'System Error: Economies of Cultural Production in the Network Society', in Malcolm Miles (ed.) New Practices - New Pedagogies: A Reader, London: Routledge.

Nick Dyer-Witheford (1999) Cyber-Marx: Cycles and Circuits of Struggle in High-Technology Capitalism, Urbana & Chicago: University of Illinois Press.

Michael Hardt & Antonio Negri (2000) Empire, Cambridge, Mass.: Harvard University Press.

N. Katherine Hayles (2002) Writing Machines, Cambridge, Mass.: MIT Press.

Naomi Klein (2001) No Logo, London: Flamingo.

Maurizio Lazzarato (1996) 'Immaterial Labour', in Paolo Virno & Michael Hardt (eds.) Radical Thought in Italy, Minneapolis: University of Minnesota Press.

Maurizio Lazzarato (1999) 'New Forms of Production and Circulation of Knowledge', in Josephine Bosma, et al (eds.) *Readme! Filtered by Nettime. ASCII Culture and the Revenge of Knowledge*, New York: Autonomedia.

Lawrence Lessig (2004) *Free Culture: How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity*, New York: Penguin <<http://www.free-culture.cc/freeculture.pdf/>>.

Tim Radford (2005) 'Military Dominates UK Science, says Report' in *The Guardian*, 20 January.

Tiziana Terranova (2000), 'Free Labor: Producing Culture for the Digital Economy', *Social Text*, 63, Vol. 18, No. 2, pp. 33-58.

Marina Vishmidt (2005) 'Precarious Straits', in *Mute: The Precarious Issue*, 29, pp. 93-95.

McKenzie Wark (2004) *A Hacker Manifesto*, Cambridge, Mass.: Harvard University Press.

All other references refer to texts in this volume.



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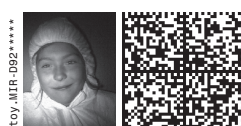
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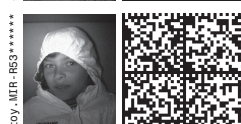
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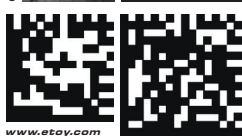
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# THE MACINTOSH COMPUTER: ARCHETYPAL CAPITALIST MACHINE?

William Bowles

## + Looking Backward

This essay was written in 1987 before the domination of Microsoft, at a time when I thought that the people running Apple computer had their act together. How wrong can you be! In other respects however, all of the ideas and concepts advanced in the essay have come to pass and in a most fundamental way. One further observation that I think is worth making about the process that led to the emergence of the Macintosh and indeed the PC itself is the role of serendipity, for it is true to say that none of it was planned, least of all by those in the corporate world - the last place to find innovation of virtually any kind. Yet the innovative period of any revolution in production is strictly proscribed. As soon as the results of innovation are incorporated into the mainstream of economic life, investment and return on investment become the determining factor. Today, the evolution of the Web epitomises this process, for what started as a tool for the academic world with which to share information, rapidly became an incubator for innovation. Once adopted by the corporate world its ability to evolve into the kind of 'general tool' of communication already incubating inside the Macintosh was - and I'm sorry to say still is being - severely hampered.

## The Macintosh

The Macintosh computer represents a fundamentally new approach to the way machines interact with people. The philosophy inherent in the Macintosh is, for the vast bulk of working people, an augur of the direction that contemporary

capitalism would like to see production relations take. At the same time the Macintosh also expresses many of the contradictions of capitalist relations, and so for this and other reasons the philosophy inherent in the Macintosh makes it an ideal example for study if we want to understand how science and technology are being used to wrest more and more surplus value from labour, whilst at the same time reducing the amount of control workers have over their own lives.

But what makes the Macintosh so different from other kinds of personal computer? Aside from the raw power of its main processor (equivalent to a room-sized machine of say 15 years ago), the operating system represents a radical departure from the essentially 'science'-based systems of such machines as the Apple II or large mainframes. By this, I mean that in order to interact with earlier forms of the computer, some considerable knowledge of the computer itself is necessary in the form of a computer 'language' that the user must first master before being able to make use of the machine's computing power.

In this sense, virtually all computers prior to machines such as the Macintosh represent the formative stages of the development of computer technology as it is expressed under capitalism.

### **The Rise of the Machine**

There are many useful analogies available to us from the first era of machine development during the Industrial Revolution that can help give us a better understanding of what the Macintosh represents. During that period the development of industrial tools followed a somewhat similar path insofar as the kinds of techniques embedded in the machines were discrete reflections of specific human skills. In other words, the first machines were not 'general tools' in the sense, for example, that the modern numerically-controlled machine tool is.

What do we mean by a 'general tool'? The process of transferring 'skills' from human to machine is essentially done in stages. The first stage involves a

craftsperson building a prototype machine which consists of the craftperson's brain/hand skill being broken down into its component parts and each process being assigned to a specific element of the machine. A good example of this process would be the metal turning lathe. The lathe itself consists of several elements. The first is motive power (this emulates muscle power), the second is measurement (which embodies generational experience of the physical environment), the third is the process of transforming the raw material into a useful product (this represents the actual tool using capability of the craftsperson).

In the development of the lathe the process of synthesising these elements may take place as follows: Power in the form of rotational motion must first be transferred to the chuck (the chuck represents a discrete, artificial form of hand for holding the work in place); a method of transferring measurements to the material to be worked on, and finally the cutting tool itself and its interaction with the material to be transformed. In the initial development of the lathe the cutting tool had to be brought in contact with the raw material manually and the measurements for how much metal to remove were also done manually (with calipers and later micrometers). But as more and more expertise became embedded in the lathe, the operator could simply set vernier dials on the machine and eventually even the act of cutting was automated via a screw-driven feed connected both to the cutting tool and the rotating chuck (it is here that we begin to see the emergence of feedback systems of some complexity, eg the lathe has to 'know' when to stop cutting). The act of developing the lathe then is a two part process: first, the job is broken down into its discrete parts which are then 're-united' via the interaction of various forms of generalised feedback (as in the above example).

The end-product of this process is the emergence of what I refer to as a 'general tool'; that is, a tool whose basic principles embody not only the specific skills of the craftsperson, but more importantly, the 'skills' are embedded in the lathe in such a way as to 'mask' not only the craft origins of the process in terms of the skills needed by the operator to use the machine, but more importantly, the

tasks are standardised via specific elements incorporated into the operating system of the lathe. This is done by 'pre-setting' the lathe as much as possible for a single task or series of tasks. In this way the operator need only know, firstly, how to load the lathe with the raw material, then how to turn it on, and finally, how to start and stop the sequence of operations that results in the end-product, the finished article.

The account above is an accurate, if abbreviated, description of the nature of the technical transformation brought about by the advent of the industrial system. That machine tools are now many orders of magnitude beyond the originals in complexity and versatility does not alter the fundamental concepts that they all utilise. Indeed, until the advent of the computer, basic machine tool design has not fundamentally changed since the 19th century, and even with the addition of computer control, such tools still use the same basic principles.

### **Microchip Meets Machine Tool**

The process started by the industrial revolution has reached a pinnacle in the form of the computer, for the computer is essentially the 'end-product' of industrialism in the sense that it acts as a unifier of discrete, industrial processes in the same way as the lathe did for craft processes. At this point we could ask a hypothetical question about the nature of the 'end-product' of computer development: what form would a computer take, if it too, were to go through the same process of rationalisation as the machine tool has? By this I mean is there an equivalent computer version of the 'general tool' for people with a 'generalised' education? The implications of such developments are, in my opinion, as revolutionary as the development of the machine tool.

The slogan 'the computer for the rest of us' is extremely misleading (and probably has a lot to do with why Apple dropped it), but buried in the idea is a kernel of truth, for indeed if - and it's a big if - some kind of standard for using computers were to be adopted by all computer makers, then the promise in the slogan could have read: 'The Macintosh, universal tool, the computer for all of us'. There are

heavy ironies on many levels, which are not only interesting to pursue simply as ideas, but also relevant to the direction society is, or could be taking.

The market economy as it is now constituted presents many obstacles to the adoption of a general tool, such as I have described above. A corporation like IBM of course has the clout to try and force its standard on everyone else, but in fact it is more likely to be the State in the form of the IRS (Internal Revenue Service) or some other large bureaucracy that decides what the standard should be (simply by virtue of sheer numbers bought and the need for a common protocol of communication).

In a sense the Macintosh operating system is a form of 'State Socialism' in that its effective operation depends on absolute adherence to what are euphemistically known as 'the Macintosh guidelines'. The user interacts with the operating system via a command structure that is the same regardless of the application. Now while I have no fundamental quarrel with this approach, for it to work effectively everything must be 'in' there - that is to say, every possible contingency must be planned for.

This, after all, is what the Toolbox is all about (note the description of the sub-routines or 'mini-programs' as Tools). It parallels very closely the kinds of standards developed in machine tools, for as with the industrial tool, the operating system effectively 'masks' the 'real' operation of the computer by interposing itself between the user and the Central Processing Unit. The operating system then is itself the 'general tool' that I referred to earlier. This approach has other drawbacks for it means that all applications written for the machine must conform to the rules or 'guidelines'. Apple even suggest that the application be sent to them for 'clearance'. What this means is that they check it to see that it doesn't 'collide' with some other application that may be co-resident with it, or parts of the operating system itself (which in turn may have already been 'harmonised' for some other application already loaded into the machine). This further suggests that one fundamental error was made in the design of the

operating system, namely that it is not a true multi-tasking machine, for a multi-tasking machine is inherently designed to accommodate different applications concurrently.

Even this modest scratching of the surface of the Macintosh reveals the incredible complexity of such a general tool, not so much because it has so many disparate functions but because they can be combined in a never-ending array of permutations. It also illustrates just how much expertise and labour is actually embedded in the machine's operating system.

### **A Further Look at the 'User Interface'**

If one looks at the commands and functions built into the Macintosh, we see that the majority of them emulate basic communications functions like drawing, positioning and pointing at objects (the so-called Quick-Draw and associated routines), as well as font manipulation. In the background of course, the operating system is active continuously, monitoring the keyboard, disk drive and so on.

The Macintosh then is a multi-purpose graphics-based computer that has a built in set of 'tools' for manipulating the Central Processing Unit (as well as the auxiliary processors) which interacts with the user through a set of choices represented by words or images. The icons are simply generalised signs for objects or functions (the use of language independent images for universal communication is well known to us through for example, international traffic signs). For example, the 'undo typing' command in Macwrite doesn't know what typing it's undoing, it just does it. The command itself is a 'generic' term, which in turn acts on certain 'assumptions' made about the command.

But with all the talk of icons on the Macintosh, it is the Word that has become the real icon, in that by generalising English words, the operating system has been 'colloquialised', or opened up to the speech of everyday interaction. In other words, 'any fool can use it'. And it is a fact that the Macintosh really is easy to use



(as well as being extremely frustrating at times); anybody can master the basic system in a very short time.

### **The Dictatorship of the Machine**

One of the chief objections to such machines as the Macintosh is the fact that it is essentially a 'black box'. By this, I mean that the inner workings of the machine are 'sealed off' from external access by the user interface. The 'shell' erected around the operating system (the menus and commands), although extremely comprehensive and easy to use, deny access beyond a certain 'depth'. By contrast, machines such as the Apple II allow penetration by any user to the basic binary system of operation that the central processor uses. Not only that, a computer such as the Apple II is physically open to anyone, with direct access to the main processor, enabling anyone with sufficient knowledge to 'tinker' with the workings of the machine itself.

By contrast many people have raised serious objections to the 'black box' approach used by machines such as the Macintosh, arguing that by making the machine into a closed system it not only reduces the range of choices open to the user, but perhaps more importantly it encourages a particular attitude towards machines in general by mystifying the processes involved, which in turn leads to a state of unquestioning acceptance of the supremacy of technology. This is of course a process that began with the industrial revolution.

A comparison between products of the first industrial revolution and the revolution we are in the middle of, illustrates the difference. The first products of the machine age were essentially simplified versions of the craft original (simplified because the machines themselves still reflected on the one hand their craft origins, and on the other because they were still relatively crude machines their powers of 'resolution' were limited). What this meant was that the products of the early machines were still accessible to the craft worker, they could be repaired or modified by hand, but perhaps more important than that, the processes embedded in the products were comprehensible to the worker.

Inevitably as the techniques used in production got more and more complex and the sophistication of the machines grew, so too the products became more and more inaccessible to the ordinary individual. In this sense then, the Macintosh reflects the general trend of industrial production to further alienate the worker from the processes she is involved in.

There are obviously a variety of forces at work that result in this development which reflect on the one hand, the nature of productive relations (increasing complexity), and on the other, the drive to increase profits (which in turn has an important effect on such things as complexity, repair versus replacement). It obviously benefits the manufacturer to replace rather than repair a product (the tag, 'no user serviceable parts inside' is by now well known to us). The issue is however more complex and reflects a much larger problem, that of the relationship between consumer and producer, which in turn is predicated on the level of education.

Elsewhere in this essay I mentioned 'general education' as a reflection of the generalising effect of industrial production on the labour process. The specialisation necessary for modern science-based production methods is predicated on the existence of a strata of the workforce who possess unique knowledge of the processes involved. This technocratic 'caste' is indispensable to modern productive forces, but even this highly trained segment of the workforce is under threat from developments in the field of so-called 'expert systems and Artificial Intelligence'.

### **Hoisted by Its Own Petard!**

Driven by the necessity of maximising profits, yet hounded by the inherent contradictions of ever more efficient production processes, capitalism has sought to resolve the conflict by on the one hand, eliminating human labour as much as possible from the process of production, and on the other, by binding it as closely as possible to the organisation and nature of production. This has been achieved through a series of scientific, technical and political revolutions.

But ever more efficient production eventually lowers profits, this is the irony of industrial capitalism. Once you have maximised the efficiency of production there is no place else to go! If wages have been held to their lowest, and you are using the most efficient machines (more efficient than any of your competitors) you will eventually find that production exceeds consumption.

Each round of technical advances has heightened the contradiction, by making production cheaper and cheaper, which means that in order to make a profit, you have to squeeze more out of the consumer, who is also a producer (or at least some of them!). The time lag between the introduction of a new technology and its eventual absorption by society grows ever shorter. Hence technical change is forced on us with greater frequency. Eventually however, it must 'bottom out', as there is a finite limit to the amount of production the world economy can absorb, at least as it is presently set up.

### **Revolutions in Production**

Each revolution of production under capitalism has been based on the introduction of a new, key invention or process. Depending on where in history you want to start from (I like to 'start' from the Renaissance, or about 500 years ago), the 'progress' of the development of machine technology can be traced by the advent of each new technology and its effect on society. In the 19th century, first the canal, then the railway. In the 20th century, first the internal combustion engine, followed by the airplane, and finally computers, have in turn formed the basis for a revolution in production.

For example, the chronograph can be seen as a key invention, which in turn stimulated and/or created the right conditions for other, connected kinds of inventions and processes. But accurate timekeeping was the result of the necessity to bind together an empire, for without it accurate navigation and hence mapping was impossible. Greenwich Mean Time is one obvious 'general tool' to emerge as a result of that event, or 'general time'; a fixed standard whereby no matter where you were in your empire, you knew how quickly you could move

your resources from one location to another. The ‘spinoff’ from the chronograph was amongst other things, an increase in the accuracy of measuring tools. This was prompted by the need for precisely made cogs and other moving parts. This in turn meant that the tools needed to turn out such devices had to be more accurate, which in turn prompted more accurate devices for making tools...

### **Homogenisation of Knowledge**

As with the invention of ‘general’ time, which was the culmination of a long historical process, each wave of innovation has eventually arrived at the point whereby general principles and standards have been extracted. Standardised units of measurement (the decimal system, electric voltages, screw thread dimensions, etc.) are the end product of many millennia of observation and practice.

Taylorism, for example, does for the actual integration of the production process, what standard units of measurement does for the machine tool itself. The invention of the telephone initiated the process of the standardisation of communications protocols. Ultimately then, it would follow that the introduction of computers into production and distribution would eventually arrive at the same destination, that of standardisation and the extraction of general principles of use. General principles would be laid down about, for example, the way computers relate to production processes. We already see such things in the field of electronic communications, but the process is of course, fragmented and uneven in its development and application.

### **The General Tool**

What they all hold in common though, is that each process is eventually so thoroughly assimilated by society, as to become a part of the ‘general knowledge’ of society (much in the same way as everyone knowing how to drive a car).

It is interesting to note that Apple has, so far successfully, squashed all attempts to imitate its user interface (the so-called desktop, pulldown menus, etc.),

threatening to sue any company that comes close to imitating the 'look and feel' of the Macintosh environment. It is tempting to speculate about what kind of long term view Apple have of the development of the computer/human environment (for good or bad). It would appear that Apple have recognised the necessity for a 'universal' means of accessing the computer. If, in one form or another, a set, standardised way of accessing computers can be established that enables the 'de-skilled' and 'unskilled' to access computers and the dead labour they contain, the complex problem of maintaining society can be handled without resort to educating everyone to the level of the university.

But for this to happen, for a critical period of time, one system must dominate! This is obviously what Apple are banking on happening. AT&T has done it in telecommunications. IBM has already done it in the 'business' environment, but that is the land of the Nabobs, we are talking about the domain of Burger King! As office automation accelerates, and virtually all forms of commercial interactions are 'standardised', the problem of utilising a deliberately under-educated workforce to handle extremely complex tasks, becomes a 'manageable' one. The standardised interface of the Macintosh lends itself well to dissolving the difference between 'factory' and 'office' work. The old, artificial hierarchy of blue and white collar work is on its way out, to be replaced by the generic, general service worker, who has enough skills to work a slick automated terminal like the Macintosh, and dispose of the output in some way (i.e. post it, stuff it or shred it), but a person who has no control over the work being done! For proof of this, we need look no further than the cash register of a typical fast food chain. The only numbers you see are the final bill! All the cashier need do is punch a button marked 'cheeseburger', or 'coke'; the built in processor handles all the addition and taxes.

The Macintosh that I sit writing this on, runs in a similar way to the fast food cash register in that, in order for example to change the font that I am using, all I need do is move the cursor to the 'button' marked font, and select one! The old way would mean knowing a set of commands that would load a different font

into memory, and then only when the document was printed. They might be, 'ESC E-56, ESC-CTRL L', and further, they would have to be inserted in the text at precisely the right point and then turned off at the appropriate point by yet another set of commands.

### **User Friendly?**

If the technical/professional elite are to maintain the system, they must make it as simple as possible to operate. By embedding the maximum number of possible states inside the code of the machine, it is possible to account for most of the situations likely to be encountered. In effect, all you need is the ability to read and follow instructions. As we saw above, no knowledge of a complex command language is necessary to make the computer do different things, the computer itself already contains all the necessary linked sets of instructions. If it goes wrong, or you do something wrong, monitors will spot it and a supervisor will be dispatched, no big deal. Each cog in the complex machine holds no indispensable power or leverage. Notice how the 'toolbox' that the Macintosh contains, parallels the synthesis of general sets of knowledge that may be accessed and comprehended by all! What we are seeing then, is an exact duplication of the first industrial revolution where craft skills were stolen and locked into the industrial machine, then perfected to the point whereby general principles could be extracted and applied to ever more sophisticated machines, each in turn, requiring less and less skill (and labour) to operate!

The languages that computers use reflect this process, for the first languages were specialised tools of mathematics and logic (again reflecting the 'craft' origins of computers), but arcane and abstruse, understood only by the select 'few'. Further, the very nature of the specialised origins of computers has led to a mystification of the processes, leading to the common misapprehension that computers are complicated, 'devilish' devices that only 'hackers' and 'eggheads' can comprehend. The Macintosh breaks with that tradition, at least in one sense. It is also, paradoxically, a logical extension of the same process! But it is the general nature of the principles embodied in computers, that makes them 'all

things to all people'. It is this apparently contradictory nature of the computer that makes it so difficult to deal with. The computer is inherently a two-edged sword, unlike the factory, yet very much a part of it. Uncannily 'human', it is nevertheless seen as the ultimate in 'inhumanity'.

### **Conclusion**

The Macintosh is very much a creature of two worlds. On the one hand, it represents the highest level of collective labour currently possible. By this, I mean that only the most integrated form of collective work could have produced such a device, utilising virtually every discipline available to us. The 'toolbox' routines represent the distillation of literally thousands of years of collective experience.

On the other hand, the computer is also an archetypal device, like the assembly line, except that it is diffused throughout the fabric of society. It is the precursor of the 'general-general' tool, a tool which will either enslave us or take an active part in our liberation. For the end product actually is the synthesis of the living, collective labour process that created it; this is one of the reasons why the conflicts raised by its existence are so intense. This is also precisely the reason why it makes such an interesting object of investigation. The key originators of the Macintosh interface, Alan Kay and R. Buckminster Fuller had a very clear picture of what they wanted it do, and how it should do it. Called the Dynabook, it was to be a paperback sized version of the Macintosh, battery powered with a complete 'toolbox' contained within it, all designed to be the literal extensions of the literate people who would use it. They saw the Dynabook as a universal tool, enabling people to communicate with each other using the collective skills embedded in the ROM chips. Add to this, the access afforded to databases of collective knowledge and you have not so much a technology but a philosophy of technology. You might call such a vision 'idealist', on the other hand the alternatives are far worse. For capital sees such tools as a means of extracting more and more surplus value from our labour. The very people who make the corporate decisions about the direction society should take, are also the same

people who would delegate the role of starting nuclear war to computers! They care very little about the impact of computers and automation on life. They would entomb ALL living labour in machines had they the power!

In very many ways, the computer, especially in its Macintosh form, also represents the very antithesis of capitalism - for in spite of the fact that it represents the forefront of capitalist innovation, it also represents the very highest level of socialised labour currently possible. Not only that, but in order to extract the maximum advantage from such technology, private ownership actually gets in the way, unless that is, there is to be one computer company, one telecommunications company, and one manufacturing company! All this tells us is that computers and automation are an inevitable end product of monopoly capitalism, which would remove all competition from our so-called 'free enterprise' system, of which Apple Corp. is so much a part. The universal tool of which the Macintosh is the precursor, has the potential to open up knowledge and hence control to all people; that is why I can regard such a tool as an extension of the intellect, and someone else might be enslaved by its simplistic, collective 'mind'. More's the pity that for most of us, such potentially liberating tools will be used against us, making them objects of fear, and in the process imbuing them with almost mystical abilities as they apparently mimic aspects of human behaviour. But like any window, the Macintosh window can be a view from a prison cell or open on to a new world waiting to be explored.

5

Brooklyn, NY (October 1987)



## Looking Forward

Firstly, some further comments on some of the observations I made about the Macintosh back in 1987. I incorrectly assumed that it would be the Mac operating system that would become the standard for the new 'general-general tool' for the 'Information Age' - the Macintosh computer. The reasons for this are essentially three-fold: Firstly, Apple decided to make the operating system proprietary, thus restricting its spread to the key people who could have made it ubiquitous, the programmer and applications developer. Second, as I said in the original essay, not making the operating system multi-tasking limited its application in the business and scientific world, an essential prerequisite for its general adoption. Third, who could have predicted that Microsoft would essentially 'steal' the Graphical User Interface from Apple and given Microsoft's association with what was then the biggest computer manufacturer in the world, IBM, dominate the market place (Steve Jobs' three major - and almost fatal for Apple - business errors). This said, everything else I touched on has remained true, including the adoption of a standard for computer/human interaction - the 'pull-down menu' with its 'Desktop' metaphor, 'File', 'Edit', 'View', 'Tools' and so forth, more commonly called the GUI. I also touched upon the emergence of a communications standard that governments and business needed to adopt and the emergence of XML (Extensible Markup Language) conforms to this view. Most importantly, XML is, like its parent, HTML, a product of the public domain. In fact, every key innovation aside from the GUI has been created and remains in the public domain.

Eventually Apple introduced OSX, its own version of a multi-tasking OS, but perhaps it might have made more sense to have adapted a version of Linux, the free UNIX OS if it really wanted to assure itself a future. Once more, the contradictions of private ownership of intellectual property in an environment that *demands* open, public domain systems is exposed. Imagine a world where the metric system was proprietary or where the Internet protocols TCP/IP were proprietary? There are two mutually exclusive processes at work here: on the one hand, the interconnected world of the computer (now an indispensable part

of virtually everything we do) demands open, non-proprietary standards and on the other, private ownership militates against sharing the profits.

Yet without a mutual, information-sharing environment, there would have been no personal computer in the first place ('All Information is Free!' was the motto of the early pioneers of the PC). This is the paradox of the computer revolution, that illustrates the contradiction of the emergence of the computer within the capitalist domain. For everything that makes the computer possible also creates the conditions for an entirely new kind of economy, that is based upon an inter-dependent culture of sharing.

As I wrote in the original essay, the key elements of the Mac are its 'Toolbox' routines, for this is the real genius of the Mac design. Indeed, elsewhere, I've drawn a comparison between the 'Toolbox' and DNA, insofar as the ROM chips in which all the thousands of routines are stored also contains much of the now 'redundant' code from earlier versions of the computer's operating system. Thus the Mac's operating system was (and is) possibly the first step on the long road toward the ultimate emulation of nature, conscious (possibly even self-conscious) 'life'.

The Macintosh 'Toolbox' is literally the amalgamation of thousands of generations of experience and understanding of the natural world in the form of equations, as well as the fusion of thousands of workers' creative efforts, in what was the first expression of a collectivised (socialised) labour process of a new kind. If the first industrial revolution saw the embedding (or theft) of experience plus the hand-eye coordination of the craftsperson in the machine tool, then the Mac represented the next (possibly final) stage with the capturing of living, intellectual effort in a machine, the stuff that underpins everything we do, our brains. Thus the uniting of the processes that underpin the principles embodied in the machine tool and in the computer was a logical next step. This is why I call it a 'general-general tool'. But is the brain to be commodified too? After all, the other revolution in our age, genetics, has already commodified reproduction.

The 'Toolbox' then, contains a vast array of equations covering all the basic elements for manipulating ideas in a variety of forms: visual, language, time, dimensions, mathematics and so forth. Once packaged and incorporated into a machine, it enables any literate person to access most of the basic knowledge acquired up until this point in time by the human species. Admittedly not all of it by any means, hence the need for additional programmes that actually utilise the Toolbox's routines. However, the programme 'Mathematica' contains virtually every equation used in mathematics, engineering, physics and so on, which when loaded into the Mac, gets very close to the creation of a portable 'container' of all the key knowledge that enables us to do work of all kinds. It should be noted that we are still in the very early stages of the process of embedding intellectual labour in machines and just as with the early expressions of the first industrial revolution, the process is still relatively crude. Hence as I pointed out in the original essay, its limitations are, and will remain, as with all analogues of human intellectual effort, finite.

What prompted me to write the original essay? When I wrote the essay back in 1987, I had since about 1979 started to explore the implications of 'computers and capitalism' and for a period of about two years spent time trying to figure out firstly, what exactly were the questions that needed to be asked? A gut feeling informed me that something very fundamental was happening that had implications for all of us but defining it proved difficult. A chance meeting guided me to the New York Marxist School in downtown Manhattan on West 19th Street where I was able to facilitate a weekly workshop called appropriately, 'Computers and Capitalism' where a small group of us explored the themes thrown up by the emergence of the computer, some of which ended up in the essay reproduced here. One of the descriptions that emerged I named 'Information Capital' (later to become known as Intellectual Capital) and it was clear even then that the computer had very fundamental implications not only for the future shape and direction of capitalism but for the very nature of work and what is now called the Cultural Production industry. Additionally and importantly, it has implications for the very nature and form of education, implications that have yet to be taken

onboard by an Establishment still locked firmly in the 19th century world of the factory.

But oddly, or perhaps not, it was the Bulletin Board System (or BBS) and FidoNet<sup>1</sup> that really triggered my interest in the potential for the PC to transform the world, and for eight years I ran a BBS called *New York On-Line* on my first Macintosh in 1984. NYOL ran out of my loft in Brooklyn, networking news and information to the planet over the Fidonet network, the precursor to the Web. Now I'm not a 'techie' or even much of a programmer (I don't have the endless patience needed to debug code) but I know how it all works and how all the pieces fit together, essential if one is to comprehend the enormity of the IT (or production) revolution. For enormous as the impact of the first industrial revolution was, the advent of the Macintosh revealed the *ubiquity* of its operating system and the power inherent in its 'Toolbox' routines.

A little earlier I had discovered the online world of Compuserve<sup>2</sup> and what was then called CB Radio (what we now call Chat Rooms) and I made my first creative foray in the world of the computer when I wrote a play for the CB environment appropriately called *online.pla* about a future world where all social interactions took place online overseen by an online police force. Hence my initial forays into the world of the computer were not technical but creative and political.

Perhaps it was my training at art school and my involvement with kinetic art that enabled me to recognise the fundamentally different nature of the Mac as a 'general-general' tool and also its beauty as a seamless fusion of (ergonomic) design and function, so good in fact, that it has not been improved on (merely degraded as in the Microsoft copy). Let me put it this way, the computer brought together four passions of mine: political economy, the arts/culture, history and technology.

A little later, I was to read David Noble's groundbreaking *Forces of Production* (1986) about the rise of the numerically controlled machine tool.<sup>3</sup> A little earlier

I had already come across Stafford Beer's prescient work with the short-lived Allende government in Chile in 1971 and the creation of a real-time cybernetic model of the economy<sup>4</sup> - one small expression of which is Supply Chains.<sup>5</sup> The idea of 'cybernetic socialism' took root in my mind even though I didn't yet possess a full comprehension of what it would take. Call it a premonition if you like. But even before then whilst still at art school I'd been able to work with R. Buckminster Fuller on geodesic domes and had come across Fuller and Alan Kay's precursor to the Macintosh, the Dynabook that I referred to in the original essay.<sup>6</sup> And in a classic example of Fuller's 'Synergetics', the sum proved to be greater than its parts.

It should be remembered that back then, the idea that knowledge in its software form as a 'commodity' raised the hackles of the traditional Left - for how could a commodity in its traditional Marxist form not be consumed? Indeed, the software programme could lose and gain value in a way that *appeared* to contradict many of the basic tenets of Marxist notions of value. A key phrase comes to mind that I believe sums up the apparent contradiction with Marx's definition of value:

'If the whole class of wage-workers were to be abolished owing to machinery, how dreadful that would be for capital which, without wage labour, ceases to be capital.' (1891)

Of course the total abolition of wage labour is simply not possible but within the developed economies if a *sufficient percentage* of key production is supplanted by machines, then the issue of the value and role of capital is seriously undermined. An example of this process is to be found in the telecommunications sector where the automation of the telephone network resulted in the classic capitalist dilemma of the falling rate of profit due in no small part to the massive reduction of human labour in the production process. Indeed, the cost of making a telephone call (in the US) fell as close to zero as can be calculated and as a result, the source of surplus value vapourised as price competition meant that there was a limit on what could be charged for a voice call and of course, surplus value (profit) cannot be extracted from machines alone.

The answer? AT&T realised that unless it took possession of the *content* that the network distributed, it faced a rocky future. As the distribution of *data* overtook that of *conversations*, it became obvious that it needed to own the data and thus it embarked on a process of acquiring the content so that it possessed not only the means of distribution but also the product (this process was also accelerated by mergers and acquisitions). The problem of course is that information as a *commodity* cannot be consumed. Moreover, its value is dependent on several factors not normally associated with traditional products. When it is incorporated into an actual physical product, for example as a computer program in a washing machine or as a movie or a piece of music or a software program the information itself cannot be ‘consumed’ and hence replaced, thus the increasing emphasis on the ownership of intellectual property. Of course continual ‘innovation’ of software and hardware drives the IT sector but as with the first industrial revolution, companies have no alternative but to buy the latest innovations - to stay ahead of the competition or go bust.<sup>7</sup>

The rise of intellectual capital brought to the fore the issue of *use value* and increasingly the role of *time* as a value. So, for example, the concept of ‘freezing’ and ‘re-freezing’ the same content but in a different form, thus adding value to the same production over and over again has taken centre stage. I first came across this when developing the first online product for Times Media Limited in South Africa back in 1994, an electronic version of an existing print product. Essentially the product had already been paid for and profit extracted through advertising revenues on the print version, hence once the relatively small investment in developing pre-press to Web tools had been paid for, it was, as the CEO commented, ‘a license to print money’.

The other fundamental process that I believe underpinned the Macintosh revolution was the realisation that in order to bring together all the elements necessary to make the ‘general-general tool’ a reality, it was necessary to step outside the boundaries of the Victorian concept of specialisation - if you like a ‘return’ to the idea of a Renaissance Man (Buckminster Fuller is another

example of this and originally trained as a naval architect, designing sea-going 'Spaceship Earths'). And the team that developed the Macintosh epitomised this approach (it included fourteen typeface designers!). Underlying this was another, even more fundamental, and in my opinion, revolutionary idea that I had actually come across as a teenager in the work of Professor J.D. Bernal in his epic five-volume work *Science in History* (1971; sadly now out of print). Bernal, who changed professions several times during his life, advocated an entirely different approach to education and even though computers didn't even exist when he wrote, his ideas emerged (in theory if not in reality) in the concept of the 'Knowledge-based Economy'. Bernal advocated the idea of a 'general' education based upon five fundamental areas of knowledge that formed the basis for all specialisations: 1. History; 2. Culture; 3. Language; 4. Biology; 5. Mathematics.

He felt that if an individual possessed a basic comprehension of these five areas of knowledge then they could pursue virtually any discipline and cited his own life as a living example. To fully appreciate this idea, consider the computer as a 'mediator' of work, an approach embodied in the idea of the Knowledge Worker. The Mac as a general tool epitomises this, as it enables someone to utilise its built-in knowledge base and apply it to their specific area of work. No longer do you need to be a programmer or an 'expert' with knowledge of IT, what is critical is an understanding of how the computer facilitates and mediates the specific skills and experience of an individual. However, in order to make this a reality an entirely new approach to education is needed, for the universal adoption of the computer puts *thinking* rather than *learning* at the centre of the educational process. If the idea of the Knowledge Worker is to be made a reality then it requires that we recognise that Intellectual Capital is not the proprietary ownership of ideas but the creative mind unleashed.



London (November 2004).

## NOTES:

1. Fidonet originated like virtually all the innovations in the world of the computer with a group of programmers in 1984 as a free and open method of sharing information (the same year I started my BBS) and is still in use to this day. A Google search yields 606,000 pages on Fidonet - <<http://www.fidonet.org/>> for more information. Like the Web, each connection or Node in the Fidonet network has a unique identifier (mine was 278/607). This is from Randy Bush's brief history of Fidonet and is indicative of the philosophy of the founders:  
'Tom Jennings intended FidoNet to be a cooperative anarchy to provide minimal-cost public access to electronic mail. Two very basic features of FidoNet encourage this. Every node is self-sufficient, needing no support from other nodes to operate. But more significant is that the nodelist contains the modem telephone number of all nodes, allowing any node to communicate with any other node without the aid or consent of technical or political groups at any level. This is in strong contrast to the uucp network, BITNET, and the Internet. [my emphasis]'  
Randy Bush, 'FidoNet: Technology, Use, Tools, and History' <[http://www.fidonet.org/inet92\\_Randy\\_Bush.txt](http://www.fidonet.org/inet92_Randy_Bush.txt)>
2. Compuserve grew out of the national computer network that serviced HR Block's tax offices and was another example of serendipity at work as some bright spark in Block's HQ in Columbus, Ohio realised that they had an office block full of mainframe computers that did nothing after office hours and so was borne the Compuserve network (later to be absorbed by AOL) that utilised the processing power and national network of leased lines to 're-freeze' the 'product'; in this case, content supplied for free by subscribers.
3. Noble's book documents the history of the numerically controlled machine tool and specifically, how the early implementers tried to exclude the engineer and toolmaker from the programming side of the process by physically locking the computers, thus preserving control at the management level. The first expressions of numerically controlled machine tools or NCMT were the defence contractors based on Long Island, NY, where the complexity of supersonic wing design was beyond even the most skilled engineer's abilities. There is more serendipity at work here as it presaged Buckminster Fuller's observation about the need for the sub-visible tolerances needed to build the components of his geodesic domes.
4. Cf. 'Designing Freedom', 'The Brain of the Firm' and 'Fanfare for Effective Freedom' by Stafford Beer. A cyberneticist, Beer devised the very first networked, real time analogue of a national economy that enabled governance to know exactly what the state of a country's economic output was. These three references are, in my opinion, the foundation stones of any future alternative to capitalism as they encompass both Marx's political economy and Norbert Weiner's understanding of whole systems and the role of feedback and homeostasis. Throw in Buckminster Fuller's concept of 'Spaceship Earth' and J.D. Bernal's revolutionary approach to education and you have the basis for a workable, viable alternative to the present madness. See <<http://www.staffordbeer.com/>>
5. Supply Chains link together an entire manufacturing process in real time, regardless of the geographical location, by creating a chain of producers who are organically linked via the Web. Dell Computer is an example of this - for Dell is, in actuality, a marketing and distribution entity that utilises the supply chain and just-in-time production and assembly by OEMs (Original Equipment Manufacturer) as it doesn't actually make computers.
6. See Fuller's 'World Design Science Decade' documents <<http://www.bfi.org/>> for an (almost) complete archive of his groundbreaking work on the role of design and economic re-organisation on a global scale.
7. In 1999, as the dotcom bubble was bursting, a leading investment analyst was being interviewed on CNN and in response to the question as to whether investors should continue to invest in the hi-tech market, he replied that the investor had no choice but invest as it was either



invest or go bust. This was a classic replay of Marx's observations on the revolution in production in the 19th century, when increases in the efficiency of factory production were occurring almost weekly, forcing manufacturers to buy the latest machinery or go bust, because if they didn't buy the latest machines, their competition would.

**REFERENCES:**

Stafford Beer (1973), 'Fanfare for Effective Freedom', The Richard Goodman Memorial Lecture, Brighton Polytechnic, Sussex; and in Beer (1975), *Platform for Change*, London & New York: John Wiley.

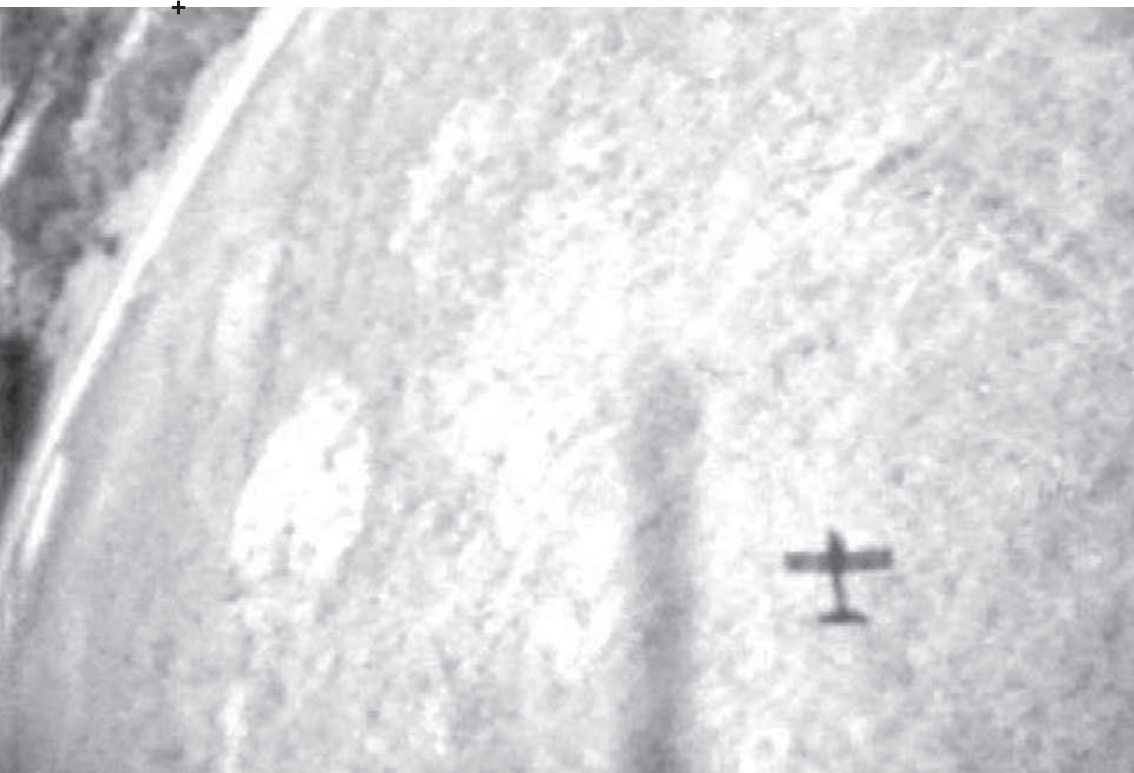
John D. Bernal (1971), *Science in History*, Cambridge, Mass.: MIT Press.

Karl Marx (1891), *Wage, Labour and Capital*, pamphlett, ed./trans. Frederick Engels; online <<http://www.marxists.org/archive/marx/works/1847/wage-labour/>>

David F. Noble (1986) *Forces of Production: A Social History of Industrial Automation*, Oxford: Oxford University Press.

# BIT PLANE

Bureau of Inverse Technology (BIT)



*bit plane flight activity over palo alto*

The *bit plane* is a radio-controlled model airplane, designed by the Bureau and equipped with a micro-video camera and transmitter. In 1997 it was launched on a series of sorties over the Silicon Valley to capture an aerial rendering. Guided by the live control-view video feed from the plane, the pilot on the ground was able to steer the unit deep into the glittering heartlands of the Information Age.



*bit plane, 1-mile flight-range, with ground guidance control unit [RC] pictured pre-flight, Hewlett Packard car park <<http://bureauit.org/plane>>.*

Most of the corporate research parks in Silicon Valley are no-camera zones and require US Citizen status or special clearance for entry. The *bit plane* (citizenship undisclosed) flew covertly through this rarified information-space, buzzing the largest concentration of venture capital in the world, to return with several hours of aerial footage.

Bureau observations recorded that the *bit plane* was traversing and transgressing several strata of airspace on this sortie. Firstly aerospace: it is illegal to fly RC aircraft within 5 miles of an airport (there were 3 airports within 5 miles of the *bit plane* flight path including Moffat Field, a Lockheed Martin and NASA jointly operated military airfield). It is also not permitted to fly model planes in the Palo Alto area due to city ordinances on noise pollution. The *bit plane* additionally violated Federal Communications Commission regulations by transmitting live video on Cable channel 51, momentarily inserting *bit plane* god's-eye video into the regularly-scheduled television viewing of the households in its flight path. So the plane revealed in its wake multiple layers of policing and control over what seemed to be transparent airspace.



*bit plane flight activity over Lockheed Missiles and Space, Palo Alto.  
(image overleaf): bit plane flight activity over Hewlett Packard, Palo Alto.*

One of the issues the *bit plane* engaged with on this mission is the threat of the camera to information space. Cameras are not permitted into the corporate research parks in the Valley, on the logic that visitors could steal intellectual property by taking photographs of it. This reveals an assumption about what information is - that it is something that you can take a photograph of, a thing - not the product of a community of expertise or social network of shared discourse, but something you could go in and steal with a camera.

This traditional view of photography, evidence and information reinforces a definition of information as property - and therefore that property laws can hold. The Bureau holds that information doesn't in fact exist or circulate in those sorts of forms.









*bit plane flight activity over the legendary Highway 101 - 40% of global Internet traffic originated or terminated in this area in 1996.*



*This text is adapted from a report delivered by bureau engineers Natalie Jeremijenko and Kate Rich at the Piet Zwart Media Design School in Rotterdam, February 2004.*





# COGNITIVE CAPITALISM AND THE CONTESTED CAMPUS

Nick Dyer-Witheford

- + The advent of 'Academia Inc.', aka 'Corporate U', is no longer an ominous prospect but an accomplished fact. Over the last twenty-five years, the universities of advanced capitalism have been metamorphosed, the shell of the ivory tower broken, and higher education firmly entrained to market-driven economic growth - in particular, to the development of high-technology industries. Universities are now frankly conceived and funded by policy elites as research facilities and training grounds for the creation of the new intellectual properties and technocultural subjectivities necessary to a post-Fordist accumulation regime. Academic traditionalists and faculty activists alike have clearly identified the dangers of this development: while the formal liberal democratic protections of academic autonomy - from tenure to civil rights guarantees - remain in place, opportunities for the practical exercise of such freedoms contract, as programme funding, research grants and curricula structuring are determined by their utility to the knowledge-for-profit economy (Newson & Buchbinder 1988; Aronowitz 2000; Ruch 2001; Slaughter 1999).

Warranted as such condemnations are, they often, however, overlook an obverse aspect of Academia Inc., a verso of which their critiques are actually symptomatic. For recent years have seen the emergence within universities of new movements and modes of struggles *against* marketisation, provoked by cognitive capital's expropriation of the university, mobilising the very constituencies of students and faculty commercialisation has summoned into being, and reappropriating

the same technologies - especially digital networks - for which Academia Inc. has been an incubator. Continuing a discussion of these ambivalent dynamics begun several years ago in my *Cyber-Marx*, and recently independently renewed by Tiziana Terranova and Marc Bousquet, this essay examines the changing configuration of academia through the lens of some theoretical categories of autonomist Marxism: 'general intellect', 'cognitive capitalism', 'immaterial labour', 'biopower' and 'multitude' (Dyer-Witheford 1999; Bousquet & Terranova 2004). Its analysis is inevitably coloured by my situation as a professor of information and media studies in a mid-sized Canadian university, but I hope to extrapolate general tendencies relevant to a European as well as a North American context; I say 'hope' in all senses of the term, since my ultimate argument is that the success of business in subsuming universities paradoxically opens the campus to intensified confrontation between cognitive capitalism and the emergent forces of what I term 'species-being' movements.

### Managing General Intellect

'General intellect' is a category given recent currency by a group of theorists including Antonio Negri, Paolo Virno, Michael Hardt, Maurizio Lazzarato, and Jean Paul Vincent associated in the 1990s with the Parisian journal *Futur Antérieur* - although many of their ideas only became widely known through Hardt and Negri's later *Empire* (2000).<sup>1</sup> The *Futur Antérieur* group derived the concept from Marx, who introduces it in the *Grundrisse* of 1857. Here he prophesies that at a certain moment in capitalism's future the creation of wealth will come to depend not on direct expenditure of labour time but on the 'development of the general powers of the human head'; 'general social knowledge'; 'social intellect'; or, in a striking metaphor, 'the general productive forces of the social brain' (1973: 694, 705, 706, 709). The emergence of 'general intellect' is signalled by the increasing importance of machinery - 'fixed capital' - and in particular by the salience of both automation and transport and communication networks.

Fragmentary as Marx's observations on general intellect were, *Futur Antérieur*

saw in them a prefigurative glimpse of today's 'post-Fordism' or 'information capitalism', with its production teams, innovation milieux and corporate research consortia yielding the 'fixed capital' of robotic factories, genetic engineering and global computer networks. But if this is so, what happens to class conflict when capital reaches the era of general intellect? Marx's dialectical prediction was that technologies of automation and communication, by reducing direct labour-time and socialising production, would inexorably render wage labour and private ownership obsolete, so that 'capital... works towards its own dissolution' (1973: 700). Things hardly seem so simple today. On the contrary, high technology and globalisation appears, at least at first sight, to have bought an unprecedented triumph to the world market, and disarray or extinction to its revolutionary opposition.

The critical issue, *Futur Antérieur* suggested, was not just the accumulation of technology - the 'fixed capital' of advanced machines that Marx had focused on. Rather, it is the variable potential of the human subjectivity that continues to be vital - though often in indirect and mediated ways - for the creation and operation of this apparatus. This subjective element they variously term 'mass intellect' or 'immaterial labour'. It is the human 'know-how' - technical, cultural, linguistic, and ethical - that supports the operation of the high-tech economy, especially evident in the communicational and aesthetic aspects of high-tech commodity production. Negri describes 'mass intellectuality' as the activity of a 'post-Fordist proletariat',

'... increasingly directly involved in computer-related, communicative and formative work... shot through and constituted by the continuous interweaving of technoscientific activity and the hard work of production of commodities, by the territoriality of the networks within which this interweaving is distributed, by the increasingly intimate combination of the recomposition of times of labour and of forms of life' (1994: 89).

The crucial question is how far capital can contain 'this plural, multiform constantly mutating intelligence' within its structures (1993: 121; *my trans.*).

Capital, Vincent observes, ‘appears to domesticate general intellect without too much difficulty’ (1993: 121). But this absorption demands an extraordinary exercise of ‘supervision and surveillance’, involving ‘complex procedures of attributing rights to know and/or rights of access to knowledge which are at the same time procedures of exclusion’.

‘Good “management” of the processes of knowledge consists of polarising them, of producing success and failure, of integrating legitimating knowledges and disqualifying illegitimate knowledges, that is, ones contrary to the reproduction of capital. It needs individuals who know what they are doing, but only up to a certain point. Capitalist “management” and a whole series of institutions (particularly of education) are trying to limit the usage of knowledges produced and transmitted. In the name of profitability and immediate results, they are prohibiting connections and relationships that could profoundly modify the structure of the field of knowledge.’ (Vincent 1993: 123)

The university is the crucial arena both for this management of general intellect, and for its disruption.

### **Cognitive Capitalism**

Let us call the commercial appropriation of general intellect ‘cognitive capitalism’.<sup>2</sup> The absorption of universities into cognitive capitalism has not been a smooth path, but the outcome of a cycle of struggles. Its origins lie in the post-war expansion of universities to provide the expanding strata of managers, technocrats and scientists required by high Fordist capitalism. The influx of these student cadres initiated the transition from the ‘ivory tower’ model to the functional ‘multiversity’, a model that is in many ways the forerunner of today’s Corporate U. The transition, however, was traumatic. From Paris to California the ‘1968’ generation of students, the first mass intake given the time and space of higher education to reflect on their life trajectory, defected from the cruelties and conformities of the industrial-military complex they were meant to serve. Their insurgencies in turn became a vital node in a circulation of social unrest that linked the mass workers of industrial factories, the emergence of new social

movements, guerrilla wars in Vietnam and elsewhere.

This tumult thrust capital on a yet faster flight into the future. Corporations went ‘cognitive’ in the 1960s and 70s not just because computers and biotech innovations were available, but also because high technology restructuring offered a weapon against the massive unrest that beset industrial, Fordist capitalism - whether by automating unruly factories, networking outsourced global production costs or green revolutionising the sites of peasant struggle. But making the shift from industrial to cognitive capital - or from Fordism to post-Fordism - required pacifying and restructuring academia. After the immediate discipline of police action, shootings and academic purges, the neoliberal response was radical reorganisation.

This reorganisation dovetailed two sets of interests: those of the state and the corporate sector. Governments beset by the ‘fiscal crisis of the state’ were keen to cut costs; business, on the other hand, wanted more control in the troublesome, but increasingly valuable, matter of education (O’Connor 1973). Over the late 1970s and 1980s rates of funding for university education in most capitalist economies were cut. Tuition fees and student debt were sharply raised. Programmes deemed subversive or - like many arts and humanities departments - simply of no use to industry were cut. These measures, alongside a climbing unemployment rate and general economic austerity, chilled student protest.

The conditions were thus set for an integration of universities and high-technology ‘knowledge industries’. Basic research was sacrificed to applied programmes. Research parks, private sector liaisons, consultancies and cross-appointments with industry, and academic-corporate consortiums burgeoned. Moneys subtracted from base operating budgets were then re-injected back into programmes of direct value to post-Fordist capital, such as schools of communication, engineering and business administration, and special institutes for computer, biotechnology and space research. University administrators moved between interlocking corporate and academic boards. Enabled by

changes in intellectual property laws to exercise ownership rights over patents resulting from government funded grants, universities become active players in the merchandising of research results. Amidst this intensifying commercial ethos, the internal operations of academia become steadily more corporatised, with management practices modelled on the private sector.

This rapprochement with academia performs two purposes for capital. First, it enables business to socialise some costs and risks of research, while privatising the benefits of innovations. Second, it subsidises capital's retraining of its post-Fordist labour-force, which is sorted and socialised for the new information economy by increasingly vocational and technically-oriented curricula that stresses skills and proficiencies at the expense of critical analysis and free inquiry. Capital becomes more intellectual; universities become more industrial. Bill Gate's Microsoft headquarters is dubbed a 'campus'; the president of Harvard University suggests American research universities provide a model corporate emulation, with their 'extensive research investment, fluid and decentralised mode of organisation: the gathering of individuals contracted to supply "intellectual capital" under a single "powerful brand"' (*Economist* 2003a: 62). This is the dialectic of corporate-university interaction in the era of cognitive capital. Yet however hard Academia Inc. tries to erase the conflicts from which it evolved, they break out anew. We will review four of these eruptions: the organisation of academic labour, the contradictions of student biopower, the involvement of universities in counter-globalisation movements, and the unanticipated consequences of networking academia.

### **Immaterial Labour: 'Will Teach For Food'**

'Immaterial labour' is the term Negri, Hardt and Lazzarato apply to the form of work characteristic of the era of general intellect (Lazzarato & Negri 1994: 86-89; Virno & Hardt 1996: 260-263; Lazzarato 1996: 133-150). Virno and Hardt define it as the labour 'that produces the informational, cultural, or affective element of the commodity' (1996: 261). It is the 'distinctive quality and mark' of work in 'the epoch in which information and communication play

an essential role in each stage of the process of production' (Lazzarato & Negri 1994: 86). Software programming, biomedical scanning, the 'imagineering' of media studios, graphics design, financial consulting and public relations are all instances of immaterial labour.

Universities in the era of cognitive capital are sites of immaterial labour in a double sense. Along with other educational institutions, they are the locales where future 'immaterial labourers' are trained and taught. And this training and teaching is itself an immaterial labour, in which the information and communication is used to shape the emergent commodity - the student - that will result from the academic process. Sraffa's famous definition of capitalism as the 'production of commodities by means of commodities' in the university setting translates into the production of immaterial labourers (students) by means of other immaterial labourers (instructors) (1960).

Capital's classic labour problem occurs when the human subject objects to the conditions of its commodification. Traditionally, universities have been exempted from this problem by the privileged position of a professoriate protected via neo-feudalistic organisational structures. But the deepening integration into cognitive capital has stripped much of this away. Following the 'lean' logic of post-Fordist capital, academic administrators demand their immaterial labourers do more with less. The one-time ivory tower witnesses intensification in the rate of exploitation. Instructors experience increases in the pace and volume of work. Faculty prerogatives of leisurely hours, time for reflection and writing, wide latitude in self-organisation of time are eroded, especially at the junior level, by increases in class sizes, performance reviews, mandatory grant getting, more required publishing, and a quiet, invisible perishing by stress.

The response seems, in hindsight, obvious: the self-organisation of its immaterial workers. Yet although the first North America faculty unions date back to the 1960s, even a decade ago administrators and professors at many major universities scoffed at the possibility of faculty picket lines and strike votes.

But the pace of faculty unionisation has accelerated alongside that of university corporatisation. In the United States a third of public university faculty are now unionised, a proportion that is, as Bousquet points out, far higher than the national average (2004). The administrative shaping of universities to corporate specifications now has to be negotiated at the collective bargaining table. Strikes are not uncommon.

By far the most militant section of university's immaterial labour force is, however, its contingent workforce. A classic strategy of casualisation decreases permanent hiring in favour of reliance on pools of teaching assistants, sessional instructors and contract faculty subjected to chronic insecurity and lack of benefits, and required to exercise mind-bending flexibility in pedagogic preparation - celebrated in Doonesbury's immortal 'will teach for food' cartoon (also, Nelson 1998). Experience of this dark-side of pedagogic labour makes this group a seething mass of discontent, and in some ways the most organisationally dynamic of all. Graduate students in particular are now an important constituency for labour organising. Teaching assistants' strikes have spread across North American campuses, involving institutions as famous as Yale and scores of others (Aronowitz 1998: 216, 213; Johnson *et al.* 2003).

Faculty bargaining may be no more, or less, radical than the unionisation of various other sectors of the public service. Indeed, as Bousquet and Terranova point out, its logic is ambiguous. Faced with a restive mass of immaterial labour, university administrators' best strategy - backed by centuries of academic hierarchy - is to ensure that regular and contingent faculty remains divided. Tenured faculty 'schizophrenically experience themselves as both labor and management', and in many cases have been have been 'complicit in the permatemping of the university', using their newly acquired negotiating power to cut deals that preserve salaries and privileges at the expense of flexibilised lecturers and TAs (Bousquet & Terranova 2004). This process tends towards what Bousquet terms, 'tenured bosses and disposable teachers'. Only if campus labour emphasises the commonality between contingent and tenured workers,



do universities face a radical and powerful union challenge.

There are, however, two aspects of faculty unionisation that deserve particular note. The first is that it represents one of the first large scale experiments in the unionisation of immaterial labour force. Cognitive capital's technological dematerialisation of its production processes was aimed at automating or bypassing the factory power of the Fordist mass worker. The 'sunrise' locales where the instruments and techniques of this process were devised, such as the production facilities of the computer industry, lay outside the scope of traditional labour organisation. The reappearance of collective labour organisation in the university - a site now made central to the development of high technology, and its associated techno-culture - thus represents a return of the repressed. This return means that many issues critical to wide swathes of immaterial workers, such as control of intellectual property rights, payment for 'measureless' work schedules, responsibilities for the self-organisation of flexible schedules, freedom of expression and the protection of whistleblowers, are likely to be brought to table in university bargaining, which may figure as a test crucible for new forms of post-Fordist contract and conflict.

Second, the organisation of university labour creates a new relation between dissenting academics and oppositional social movements. Negri and Lazzarato suggest that when universities were more marginal to capitalism, academics engaged themselves with political movements from a position of apparent exteriority. Today, when university teachers find themselves unequivocally involved in capital's appropriation of 'general intellect', possibilities emerge for academics to make more 'transverse' connections (1994). Rather than descending from the heights to commit themselves to a cause largely external to their daily experience, academics become the carriers of particular skills, knowledges and accesses useful to movements - for example, those against the privatisation of public facilities, or in 'living wage' campaigns supporting service workers on campus and in local communities - in which they participate on the basis of increasing commonalities with other members of post-Fordist 'mass intellect'.

## **Student Biopower**

The other vital factor in the changing composition of academia is its expanding student population. The paradox here is that even as cognitive capital makes higher education more costly, it draws more people in, on a model that Bousquet and Terranova call 'Wide access, but fee-for-service' (2004). The new entrants are mainly young people for whom a degree has been pre-defined as a job qualification, and course selection as shopping for career skills, although there is also a mature contingent undergoing the perpetual occupational upgrades termed life-long learning. Neoliberal apologists point smugly to increasing participation rates in post-secondary institutions, while ignoring the levels of stress and sacrifice this involves; when failure to enter the ranks of immaterial labour is a sentence of social exclusion, studentship becomes an experience no one can afford to miss.

These new cadres of immaterial labour in training are more diverse in gender and ethnicity than previous generations. This is the outcome of protracted struggles for inclusion and recognition, both as students and teachers, by women, peoples of colour, aboriginal peoples, new immigrants, homosexuals and many other subordinate groups. These minority struggles (in the Deleuzian sense of departing from a traditional white male heterosexual norm) were, from the 1970s to the 1990s the most active front of campus politics, eliciting a furious reactionary backlash against the supposed menace of 'political correctness'. But both the real success and the impassable limit of campus identity politics is marked by its recuperation to cognitive capital's drive for a wider recruitment of social intelligence.

An official academic credo of multiculturalism and gender-equity opens the way to more comprehensive and efficient commodification of intellectual labour-power. One positive outcome of the shattering of the ivory tower is thus a cracking of the academic hegemony of the white male. This is not to say this hegemony has been annihilated; in some cases crucial to the formation of immaterial labour, such as computing science and engineering faculties, where female participation rates in

North America have actually declined in recent years, it has barely been dented. But despite the persistence of racism and sexism within academia, at least their gross manifestations are now likely to be viewed at senior administrative levels as undesirable obstacles to the total mobilisation of general intellect.

This mobilisation is comprehensive, not only in terms of the numbers and heterogeneity of the student populations, but in the completeness of their envelopment in commodification processes. University students are not only, as immaterial labour in training, the subjects of the reproduction of labour power. Very many are already subjects of production, meeting high tuition fees by working their way through school, often in low-paid McJobs, as ‘netslaves’ in the precarious sectors of information economy, or, at the graduate level, as research and teaching assistants. At the same time, they are also subjects of a consumption-regime of unprecedented intensity. Students are amongst the demographic niches considered most desirable, and most aggressively targeted by youth culture marketers; they inhabit campuses where corporate logos, saturation advertising and promotional events sprout from every cafeteria, plaza and dedicated lecture theatre. Such a multi-dimensional, omnipresent engagement with commercial processes makes students quintessential examples of what Hardt and Negri term ‘biopower’ (2000) - that is, a subject of capitalism that taps the psychophysical energies at every point on its circuit: not just as variable capital (labour), but also, as a circulatory relay (consumerist, ‘mind share’), a precondition of production (the general pool of biovalues and communicative competencies necessary for ‘general intellect’), and even as constant capital (for example, as experimental subject).

Divided from earlier cycles of student radicalism by the cultural amnesia arising from neoliberal restructuring, this is a generation for whom the anti-Vietnam war movement or Berkeley free speech movements are items of parental nostalgia or retro-movie sets. Yet it has its own sources of discontent, bred from the very scope of their engulfment by cognitive capital. Skyrocketing debt loads means that for many education seems the inauguration of indentured servitude.

Working one's way through school in the contingent sector gives a good look at the underside of the new economy, and a rapid education in the registers of post-Fordist exploitation. Saturation by viral advertising and the marketing ploys of cool hunters can result, not in a passive induction to consumerism but as hyper-vigilant cynicism towards corporate culture and commercial media (Klein 2000). Moreover, mobilisation as student biopower is contradictory. Interpellated almost simultaneously, as subjects of disciplined preparation for privileged managerial responsibility, as subservient and badly-paid service workers and as compulsive hedonistic consumers, contemporary students are in the cross hairs of the 'cultural contradictions of capital' - a situation of fragmenting multiplicity, generating responses that cycle through frantic self-promotion to numbed indifference to political dissent (Bell 1976).

### **The Multitudinous Campus**

From the early 1990s, new currents of activism percolated across North American and European campuses (Vellela 1988; Loeb 1994; Overtz 1993: 70-95). Many were protests against fees, debt-loads and declining learning conditions. They also, however, involved actions against the corporate branding of campus facilities, resistance to the commercial development of university lands; campaigns against university linkages to authoritarian foreign regimes. Very rapidly this radicalism connected with the wider currents of social dissent.

Here it is significant that *Futur Antérieur's* analysis of general intellect arose in the context of the great French general strikes of 1996, opposing the Juppe government's neoliberal regime of privatisation and cutbacks. These strikes involved many technically skilled immaterial labourers - nurses and medical paraprofessionals, air-traffic controllers, workers in the most automated car factories - and also university students and instructors, protesting rising tuition fees and declining conditions of teaching and learning. These strikes have been described as 'the first revolt against globalisation' (Raglu 1996: 1-22), and though this is not entirely accurate, their eruption, bracketed between the Zapatista uprising of 1994 and the Seattle demonstrations of 1999, certainly

marked the rising arc of social unrest variously known as anti-globalisation, counter-globalisation, the new internationalism, the global justice movement, or what Negri and Hardt describe as the revolt of a heterogeneous anti-capitalist 'multitude against Empire' (2000: 93; 2004; Virno 2004).

The dynamics of this broad and complex movement have been widely debated, so I comment here only on some points directly related to universities in the global North. It is possible to identify specific campus-based components within the counter-globalisation movement. In North America, one could point to the emergence of Students Against Sweatshops; to faculty and student movements against the corporate patenting of anti-HIV retroviral drugs made on the basis of university research; and to the groups building solidarity with students studying under conditions of extreme repression in Indonesia or Palestine. However, such a catalogue would be deceptive, because student involvement has been critical to moments and movements that are not specifically campus based. Rather, student activism manifests as a suffusion of youth activism and intellectual energy into wider circuits.

Thus, for example, in the cycle of street demonstrations that ran from Seattle to Genoa, a huge number of participants were students from universities, colleges and schools. To cite an instance from my own experience, at the demonstration against the Free Trade Area of the Americas in Quebec City in 2001, while trade unions and NGOs, afraid of being seen as 'violent' marched away from the fence surrounding the summit site to listen to speeches in a parking lot, it was students who confronted police at the barrier separating policy makers from populace, conducted civil disobedience and risked arrest in tear gas filled streets. More generally, student counter-globalisation politics has not treated universities as self-enclosed arenas of activism, but rather as nodes or platforms within wider networks. Campuses have their chapters of Oxfam, their Third World debt cancellation committees, and their anarchist affinity groups; but these are constituted in connection to a multitudinous array of other groups, situated in unions, churches, schools, NGOs, housing cooperatives or homeless shelters.

Although we have already inventoried some students' grievances against neoliberalism, there is one additional factor that should be mentioned here to explain their widespread participation in the counter-globalisation movement, one that diametrically contradicts cognitive capitalism's vision of *homo hyper-economicus*. This is the idealism of the young, activated in the context of global communication and transport networks. Contemporary universities are, almost unavoidably, cosmopolitan in their culture. Students are aware, at some level, of global inequalities. If they chance on the right courses, they learn about these relative and absolute deprivations. They may witness them first hand, either through tourism, work and study abroad, or diasporic family connections. Despite the massive filtering of commercial media, some glimpse of the scope of planetary immiseration is unavoidable in the circulation of broadcast and digital images that inundates everyday life in general, and campuses in particular. To the degree that students are not fully conditioned to the affective hardening required by the world market, or to psychologically managing the contradiction between liberalism's overt principles and its real economic basis, they are disquieted by the disparity between their conditions and that of the majority of the world's population. They are also, often as it were in the same breath, frightened by what these inequalities mean in terms of the fragility of the world order, of which they are beneficiaries. Uneasy awareness of privilege, even, or perhaps especially, by white upper middle-class students, and desire for a just and safer world order can be a radicalising effect of cognitive capital's globalised optic.

### **Digital Diploma Mills and Pirate Colonies**

Vincent observes that general intellect is in fact 'a labour of networks and communicative discourse'; it is 'not possible to have a "general intellect" without a great variety of polymorphous communications' (1993: 127). One of the defining features of cognitive capitalism is its elaboration of high technology communications systems, of which the most famous is the Internet. Universities have been indissolubly associated with the Net at every moment of its paradoxical history. Its original Pentagon funded development was a classic instance of the military-academic cooperation; its ad hoc growth as a civilian

system based on public funding and open protocols was the work of hacker students and computer science professors; and the launching of a 'dot.com' boom proceeded via the corporate privatisation of academic digital discoveries and spin-off effects, such as those resulting from Stanford University's presence in Silicon Valley.

Academia has in turn been transformed by its own invention. Campuses are today sites of mass digital apprenticeship, where to study means to use a computer, preferably to own one (possession is mandatory at some universities) and to be totally familiar with search engines, web sites, on-line databases, chat rooms, and email. In the 1990s, universities themselves became a direct target of dot.com enterprise with the drive towards the 'Virtual U' - code for the activities of corporate-academic partnerships entrepreneurially pushing the commercial development of large-scale, computer-mediated tele-learning systems.

These experiments were promoted under the banner of accessibility, innovation and inevitable technological progress. But critics such as David Noble not only challenged the paucity of the pedagogical theory behind this project, but argued that such ventures aim at nothing less than the commodification of the university's teaching function, converting academia into what he scathingly terms 'digital diploma mills' (2002). They aim, he says, at 'transforming courses into courseware, [and] the activity of instruction itself into commercially viable proprietary products that can be owned and bought and sold in the market' (2002: 12). At the core of this process is a classic industrial strategy of deskilling and automation, downloading instructors' knowledge into reusable software packages over whose use faculty surrender control. In recent years, administrative enthusiasm for Virtual U experiments seems to have waned in North America, partly as a result of the bursting of the Internet bubble, but also because of the active resistance of both students and faculty at a number of universities. Nonetheless, the 'digital diploma mills' issue remains alive, with university instructors constantly facing the prospect of technological speed up in work-loads through envelopment in on-line teaching requirements, complete

with endless email solicitations, web site preparations, and monitored electronic activities.

There is, however, another side to the networking of the universities. Ironically, cognitive capitalism has failed to contain and control the digital communication system that is the greatest achievement of general intellect. In cyberspace, the vectors of e-capital tangle and entwine with a molecular proliferation of activists, researchers, gamers, artists, hobbyists, and hackers. Networking of universities means that millions of students have access to these subversive dynamics. The multitudinous politics of the counter-globalisation movement, for example, are widely recognised to have been impossible without the Net and the rhizomatic connections it enables (Meikle 2002; McCaughley & Ayers 2003). From the emailed communiqués of Zapatista spokesperson Subcommandante Marcos through the networked opposition to the Multilateral Agreement on Investment, to the parody of official WTO web sites in the 'Battle of Seattle', to experiments in electronic civil disobedience, net strikes, and other forms of 'hacktivism', the Internet has been made into a vehicle of contemporary anti-capitalist self-organisation. There are now circulating through cyberspace innumerable threads of discussion and critique about neoliberal policies and alternatives to them, creating what Harry Cleaver has termed an 'electronic fabric of struggles' (1994: 145). Much of the weaving of this fabric has been the work of students and academics and all of it can be found, whether by intentional search or serendipitous discovery, by other students and academics researching economics, sociology, political science, environmental science or a thousand and one other topics.

Another consequence is that even as universities may be becoming digital diploma mills, they are certainly now pirate colonies. Ease of digital reproduction and the speed circulation are blasting gaping holes in the fabric of intellectual property. As Richard Barbrook notes, while the official ideology of post-Cold War North America is triumphal celebration of the free market, in their daily practice millions of Americans are actually involved in an on-line digital circulation of



free and unpaid music, films, games and information in a culture of open source and free software initiatives and digital gift economy practices that in effect amounts to a form of ‘dotcommunism’ (1999).

These practices are part of the daily life of university students. Peer-to-peer networks such as Napster and Gnutella, and their more recent successors, such as Kazaa and Bit Torrent, which are terrorising the music, film and games conglomerates, are very largely academia-based phenomena, created and used by students. The music business now seriously contemplates ‘that parents could be presented with a bill for their child’s downloading activities at college, and degrees could be withheld until someone pays’, and the Massachusetts Institute of Technology has had to resist subpoenas from the industry ‘seeking the names of students it suspects of being heavy file-sharers’ (*Economist* 2003b: 43). The defendants in many of the landmark cases contesting the intensifying corporate enclosure of digital networks are student hackers, samplers and pirates.

‘P2P’ is the product of a student generation for whom the potentialities to freely reproduce and circulate digital information have become the basis of what Hardt and Negri call ‘a kind of spontaneous and elementary communism’ (2000: 257). The ‘electronic fabric of struggle’ is the organisational tissue of an anti-corporate and anti-capitalist politics. Many will object to mentioning music piracy in the same breath as political activism. But both are on a collision course with the property regime of capital in its most advanced forms. Although the worlds of Indymedia centres and free downloads do not necessarily intersect, there is a connection between them in terms of rejection of commodification and privatisation. In their explorations of both tactical media and peer-to-peer networks, students are in the midst of a very practical, hands-on contestation of cognitive capital’s control over the means of communication.

### **Armoured Globalisation and ‘Species Being’ Movements**

Forty years ago, campuses could become temporary red ghettos, but there was a fundamental divorce between these enclaves and the more general conditions

of work and exploitation. Today, the much tighter fusion of academia with larger social circuits - a product both of the corporate breaking of the ivory tower and of its associated digital diffusion - removes such relative freedom, but opens other possibilities. The conventional distinction between university and the 'real' world, at once self-deprecating and self-protective, becomes less and less relevant. If students and teachers lose some of the latitude of action relative privilege once afforded, they also become potentially participant in, and connected to, movements outside the university. These movements in turn, are drawn into the orbits of socio-technological innovations, such as the Internet, where universities continue to provide a matrix of radical experimentation. The corporate world's subsumption of the campus generates a mirror-world of counter-capitalist activity.

The current scope and the capacity of this activity should not be exaggerated. The forces presently challenging cognitive capital in today's university campus are real, but sporadic and unsynchronised - a scattering of micro-resistances, occasionally constellating in a loose mesh of affinities. This mesh could unravel. In the aftermath of 9-11, the 'war on terror' has drawn a dark, scorched line across the horizon towards which so many radical rivulets and transformative tributaries were flowing. It brings to crescendo what many heard approaching: confrontation between the techno-cultural whirlwind of cognitive capitalism and an array of religious-ethno-nationalist fundamentalisms arising as a defensive response to the immiseration and disruptions of the world market: 'Jihad versus McWorld' (Barber 1995). In this neo-extermist spiral, the amazing techno-scientific expressions of general intellect will not appear as retrovirals and open source software, but instead as swarms of robotised battle-drones chattering to each other in the skies over smoky landscapes as they search for mobile, weaponised smallpox laboratories.

In this context, there is a risk that all types of dissent will be de-legitimised and attacked. The chilling effect has already been felt on campuses in the United States, for example in the proposals to replace programmes of post-colonial

studies, seen as over-critical of imperial hegemony, with programmes that train experts in Islam and Arabic languages in a way that is functional to 'homeland security' requirements. As we enter a phase of 'armoured globalisation', in which continued expansion of the world market is accompanied by hyper-militarisation, we can expect further closures of intellectual space. So too, however, can resistance expand to these closures. Students and their teachers were widely involved in the massive movements of opposition to the Iraq war, defiantly in the United States and in the United Kingdom, successfully in Canada and in many parts of Europe. Currently, in the aftermath of a second electoral victory by the Bush regime, counter-globalisation and anti-war movements are in a phase of recomposition. The outcomes are uncertain. But, to be unabashedly speculative, and in a spirit of grounded utopianism, I would suggest that this moment opens towards the emergence of 'species being' movements.

'Species being' is the term the young Marx used to refer to humanity's self-recognition as a natural species with the capacity to transform itself through conscious social activity (1964).<sup>3</sup> Today, in the era of the Human Genome Project and the World Wide Web, species-being manifests in a techno-scientific apparatus capable of operationalising a whole series of post-human or sub-human conditions. By entrusting the control and direction of this apparatus to the steering mechanism of marketisation, cognitive capital is navigating its ways onto some very visible reefs: a global health crisis, biospheric disaster, yawning social inequalities dividing a world well seeded with terrifying arms.

Species-being movements are biopolitical activisms that contest this trajectory, opposed to both the world market and reactive fundamentalisms, characterised by cosmopolitan affinities, transnational equalitarianism, implicit or explicit feminism, and a strong ecospheric awareness. Generated within and against a capitalism that is 'global' both in its planetary expansion and its ubiquitous social penetration, species-being movements will aim to fulfill the universalisms the world market promises but cannot complete. They will invoke some of the same intellectual and co-operative capacities cognitive capital tries to harness,

but point them in different directions, and with a vastly expanded horizon of collective responsibility. They will establish networks of alternative research, new connections and alliances; they build a capacity for counter-planning from below.

Universities will be key in this contestation. The possibility of such an academic counterflow exists because, to effectively harness mass intellect to accumulation, capital must maintain a certain degree of openness within the universities. Part of what it seeks in its invasion of academia is the creativity and experimentation of immaterial labour-power, qualities vital to a high-technology economy based on perpetual innovation. But if industry is to benefit from such invention-power, it cannot entirely regiment the institutions of education. However carefully it circumscribes the budgets and mission-statements of academia, capital's incessant search for competitive advantage requires chances for unforeseen synthesis, opportunities for the unpredicted but really profitable idea or invention to emerge. And this gives a limited but real porosity to universities.

Dissident students and academics linked to species being movements can exploit this porosity, to research and teach on topics of value to movements in opposition to capital; to invite activists and analysts from these movements onto campuses and into lectures and seminars; and to use the university's resources, including its easy access to the great communication networks of our age, to circulate news and analysis that are otherwise marginalised. Earlier, I cited Vincent's suggestion that capitalism's managers are, 'in the name of profitability and immediate results' interdicting 'connections and relationships that could profoundly modify the structure of the field of knowledge' (1993: 123). Some of these connections and relationships include: the establishment of new planetary indices of well-being beyond monetised measurement; investigation of new capacities for democratic social planning provided by information technologies; the development of systems of income allocation and social validation outside of obligatory waged labour; the emergence of new models of peer to peer and open-source communication systems; the critique of dominant paradigms of political

economy in the light of ecological and feminist knowledges; the refinement of doctrines of global ‘public goods’ and of concepts of global citizenship; and the formation of aesthetics and imaginaries adequate to the scope of species-being. At the onset of the twenty-first century, cognitive capital is, in its self-appointed role as planetary pedagogue, posing every major question that confronts humanity in terms of marketisation, monetisation, competition and profit. But the more insistently it demands that general intellect respond to this catechism, the greater the likelihood it will start to get answers other than those it expects.

5

## NOTES:

1. Writings of this group can be found in Virno and Hardt's *Radical Thought in Italy* (1996). A key essay is Virno's 'Notes on the General Intellect' (in Makdisi et al. 1996); for later discussions of 'general intellect', see Hardt and Negri's *Empire* (2000) and Negri's *Time for Revolution* (2003). See also Terranova's 'Free Labor: Producing Culture for the Digital Economy' (2000: 33).

2. On 'cognitive capitalism', see the on-line papers from 'Class Composition in Cognitive Capitalism', University of Paris, 15-16 Feb 2002, available at <<http://www.geocities.com/CognitiveCapitalism/>>.

3. For discussion of species-being movements, see Dyer-Witheford's 'Species-Being Resurgent' (2004: 476-491; and forthcoming '1844/2004/2044: The Return of Species-Being', in *Historical Materialism*).

## REFERENCES:

Stanley Aronowitz (1998) 'The Last Good Job in America', in Stanley Aronowitz & Jonathan Cutler (eds.) *Post-Work: The Wages of Cybernation*, New York: Routledge.

Stanley Aronowitz (2000) *The Knowledge Factory: Dismantling the Corporate University and Creating Higher Learning*, Boston: Beacon.

Benjamin Barber (1995) *Jihad versus McWorld*, New York: Times Books.

Richard Barbrook (1999) 'Cyber-Communism: How the Americans are Superseding Capitalism in Cyberspace', <<http://www.hrc.wmin.ac.uk>>.

Daniel Bell (1976) *The Cultural Contradictions of Capitalism*, New York: Basic.

Marc Bousquet & Tiziana Terranova (2004) 'Recomposing the University', in *Metamute: Culture and Politics After the Net*, 28, <<http://www.metamute.com>>.

Harry Cleaver (1994) 'The Chiapas Uprising', in *Studies in Political Economy*, 44, Ottawa.

Nick Dyer-Witheford (1999) *Cyber-Marx: Cycles and Circuits of Struggle in High Technology Capital*, Urbana: University of Illinois Press.

Nick Dyer-Witheford (2004) 'Species-Being Resurgent', in *Constellations*, vol. 11, no. 4, New York: Blackwell.

Economist (2003a) 'Companies and Universities: A Little Learning', 26 July, <<http://www.economist.com>>.

Economist (2003b) 'Tipping Hollywood the Black Spot', 30 Aug, <<http://www.economist.com>>.

Michael Hardt & Antonio Negri (2000) *Empire*, Cambridge, Mass.: Harvard University Press.

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

Benjamin Johnson, Patrick Kavanagh, Kevin Mahan (2003) *Steal This University: The Rise of the Corporate University and the Academic Labor Movement*, New York: Routledge.

Naomi Klein (2000) *No Logo: Taking Aim at the Brand Bullies*, Toronto: Knopf.

Maurizio Lazzarato & Antonio Negri (1994) 'Travail immaterial and subjectivité', *Futur Antérieur* 6.

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

- Paul Loeb (1994) *Generation At The Crossroads: Apathy and Action on the American Campus*, New Jersey: Westview.
- Karl Marx (1964) *The Economic and Philosophical Manuscripts of 1844*, NY: International.
- Karl Marx (1973) *Grundrisse*, Harmondsworth: Penguin.
- Martha McCaughey & Michael D. Ayers (eds.) (2003) *Cyberactivism : Online Activism in Theory and Practice*, New York: London.
- Graham Meikle (2002) *Future Active: Media Activism and the Internet*, New York: Pluto.
- Antoni Negri (1994) 'Constituent Power', in *Common Sense*, 16. Edinburgh.
- Antonio Negri (2003) *Time for Revolution*, New York: Continuum.
- Cary Nelson (ed.) (1998) *Will Teach for Food: Academic Labour in Crisis*, Minneapolis: University of Minnesota Press.
- Janice Newson & Howard Buchbinder (1988) *The University Means Business: Universities, Corporations and Academic Work*, Toronto: Garamond.
- David Noble (2002) *Digital Diploma Mills: The Automation of Higher Education*, Toronto: Between the Lines.
- James O'Connor (1973) *The Fiscal Crisis of the State*, New York: St Martins.
- Robert Ovetz (1993) 'Assailing the Ivory Tower: Student Struggles and the Entrepreneurialization of the University,' in *Our Generation*, vol. 24, no.1, Montreal: Black Rose.
- Krishnan, Raghu (1996) 'December 1995: 'The First Revolt Against Globalization'', *Monthly Review*, vol. 48, no. 1, New York
- Richard S. Ruch (2001) *Higher Ed, Inc: The Rise of the For Profit University*, Baltimore: John Hopkins University Press.
- Sheila Slaughter (1999) *Academic Capitalism: Politics, Policies and the Entrepreneurial University*, Baltimore: John Hopkins University Press.
- Piero Sraffa (1960) *Production of Commodities By Means of Commodities: Prelude to a Critique of Economic Theory*, Cambridge: Cambridge University Press.
- Tiziana Terranova (2000) 'Free Labor: Producing Culture for the Digital Economy', in *Social Text* 63, vol. 18, no. 2, Durham: Duke University Press.
- Tony Vellela (1988) *New Voices: Student Activism in the 80s and 90s*, Boston: South End Press.
- Jean-Marie Vincent (1993) 'Les automatismes sociaux et le 'general intellect'', *Futur Antérieur*.
- Paolo Virno & Michael Hardt (eds.) (1996) *Radical Thought in Italy: A Potential Politics*, Minneapolis: University of Minnesota Press.
- Paulo Virno (1996) 'Notes on the General Intellect', in Saree Makdissi, Cesare Casarino & Rebecca E. Karl (eds.), *Marxism Beyond Marxism*, London: Routledge.
- Paolo Virno (2004) *A Grammar of the Multitude*, New York: Semiotext(e).

# ENGAGING AMBIVALENCE: INTERVENTIONS IN ENGINEERING CULTURE

## The Institute for Applied Autonomy (IAA)

- + The most significant underwriter of engineering research in the United States is the Department of Defense, largely acting through the Defense Advanced Research Projects Agency (DARPA). DARPA exists to channel funds from the military to academic and corporate research labs in exchange for technological innovations that serve the needs of its clients - the Army, Navy, Air Force, and Marines. As DARPA public relations officers are fond of pointing out, innovations funded by DARPA grants may also find expression in civilian applications, particularly in the communications and aerospace industries.

Researchers ('principal investigators') are held accountable to DARPA programme managers via aggressive schedules of milestones, deliverables, and administrative review. Framing this process as a form of cultural co-production implicates both researchers and military officers as active participants in constructing military-funded civilian research, and highlights tensions between martial and academic approaches to knowledge production. This depiction reveals opportunities for interventions that pose deep challenges to engineering culture.

### **DARPA review as co-production**

DARPA's mission, 'to maintain the technological superiority of the US military and prevent technological surprise from harming our national security by sponsoring revolutionary, high-payoff research that bridges the gap between



fundamental discoveries and their military use', is a narrative of transcendence. As the titles of two of its recent *DARPAtech* conferences suggest, the agency is concerned with 'Bridging the Gap' (2004) between laboratory research and battlefield application, or more poetically, with 'Transforming Fantasy' (2002) into martial reality.

Like other institutions that employ 'fantasy into reality' imagery (e.g. Disney, the pornography industry), DARPA is in the business of creating and satisfying desire. DARPA program managers entice academics with fanciful visions of future combat scenarios informed by science fiction and video games. These solicitations are cryptic pronouncements to be interpreted by principal investigators at competing research laboratories and presented back to DARPA in the form of proposals and prototypes. The most stimulating submissions are selected for further development while the rest are abandoned, unworthy of further attention. Principal investigators who keep their programme managers satiated are in turn nourished with DARPA funding and the support of their host institutions. Researchers who fail to satisfy DARPA managers must look to other, less well-endowed, funding sources or be denied resources and, often, tenure.

Research prototypes thus become the 'word made flesh' (or, more accurately, silicon and steel), embodiments of desire created through a cyclical process of co-creation by researchers and programme managers. Through proposal solicitations, review sessions, and demonstration milestones, researchers continuously labor to engage DARPA managers in the co-construction of technologically enabled martial fantasy, enjoying the bounty of continued funding where they succeed and adjusting their products where they fall short.

### **Re-interpretation as Intervention**

Because their operations depend on the unfettered flow of DARPA funding, research and development labs generally rely on literal interpretation strategies when deciphering DARPA solicitations. Artists and amateurs, on the other hand,

have much more latitude in their reading of DARPA texts and are free to explore the metaphorical value of DARPA concepts. For example, our ‘Contestational Robotics’ (2004) initiative proceeds from a loose reading of DARPA’s *Tactical Mobile Robotics* programme:

‘The *Tactical Mobile Robotics* program is developing robotics technologies and platforms designed to revolutionize dismounted operations by projecting operational influence and situational awareness into previously denied areas.’

Recognising the references to ‘denied areas’ as a metaphor for the privatisation of public space, we developed several devices that allow artists, activists, and juvenile delinquents to ‘project operational influence in ways that humans cannot by using reliable semi-autonomous robotic platforms’. Like their military counterparts, our graffiti writing (figure 1) and humanoid propaganda machines (figure 2) are intended to perform actions too risky for human actors - although, in our case, the ‘operations’ include spray-painting slogans and distributing subversive literature, and the ‘denied areas’ are government buildings, shopping malls, and public streets.

Similarly, our metaphorical reading of the *Small Unit Operations: Situational Awareness System* concept (‘mobile communication system... optimized for restrictive terrain’ that relies on ‘wearable computing’ to ‘maintain communications and situational awareness in a difficult urban environment’) substitutes civilians for soldiers and cities for battlefields. Taking this conceptual turn reveals a need to monitor and avoid surveillance camera networks (figure 4), and the utility of a cell phone text messaging service that allows demonstrators to coordinate actions and track police movements during political protests (figure 3).

### **Normalised Ambivalence**

By explicitly addressing political issues, our projects challenge engineering culture. As a practice, engineering proceeds through a highly productive ambivalence about the relationship between engineers and the society in which

they operate. On the one hand, engineers are fundamentally concerned with acting on a world that they perceive as ‘essentially problematic... an opportunity for continuous, useful, material, development’ (Holt 1997). We may call this the da Vinci impulse - the capacity for innovative material production that draws upon all of the arts and sciences to increase understanding and improve the human condition. At the same time, engineering views itself as a service industry whose primary responsibility is to provide technical expertise to its employers (CoEE 2003). This is the Dilbert impulse - the tendency to myopically focus on technical problems and leave consideration of a product’s ultimate use to marketers and end-users.

While the da Vinci impulse energises a highly skilled workforce dedicated to solving ‘hard problems’, the Dilbert impulse provides ethical justification when those problems arise in conjunction with morally dubious applications. The ambivalence embodied in these contradictory formulations of engineering practice is enabled by a conception of technology as value-neutral tool that, by extension, insists technological development is an ethically indifferent activity. This instrumental view of technology (Feenberg 1991) and ambivalence towards the world are normalised through immersion in engineering culture - primarily in technical universities.

In addition to providing technical innovation for the military, DARPA involvement in academia normalises ambivalence among students and researchers. Although the agency’s motivation is to enhance the military’s ability to win wars and kill enemies, open declarations of martial efficacy are rare within academia. Instead, DARPA-supported research is presented to the academic community (including the students working on military projects) in abstract terms, as ‘optimization algorithms’ and ‘enabling technologies’. Civilian applications are highlighted, thus fostering a sense that the particular (and, by extension, all) technologies are neutral. The rhetorical work done by this positioning of military research relies on the slippage between ‘dual use’ technologies, which have a varied but limited set of military and civilian applications, and ‘general purpose’ tools, which can

be brought to bear on virtually any problem. While it may be argued that in practice there can be no such thing as a general purpose tool (Weizenbaum 1976), emphasising civilian applications for a DARPA-funded research project downplays the particular application for which it has been designed and frees the engineer from responsibility for the uses to which it will most likely be put. The culture that celebrates technology's neutrality thus mobilizes ambivalence as a mechanism that enables thoughtful, well-intentioned individuals to work on projects they would otherwise find morally repugnant.

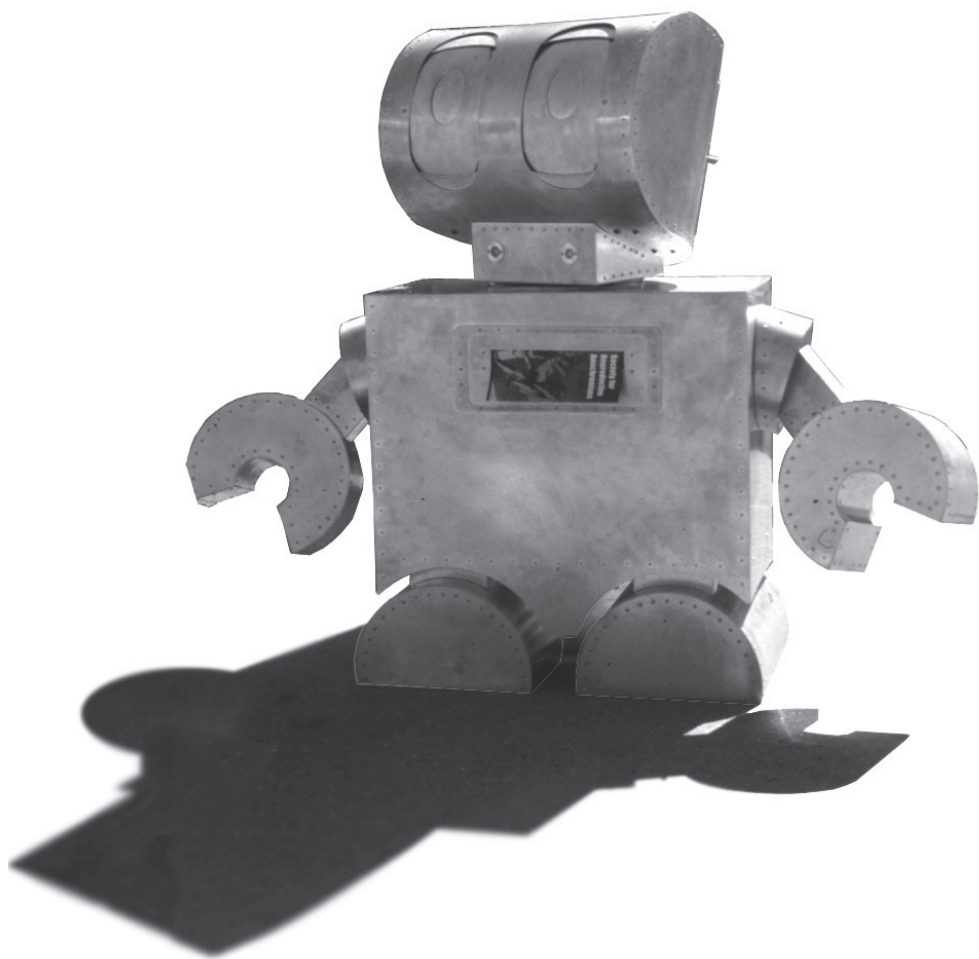
### **Infiltration and Tactical Aesthetics**

As an organisation, the IAA is an exercise in tactical aesthetics - we use the visual and rhetorical devices of sanctioned research organisations in an elaborate performance aimed at infiltrating engineering culture. By demonstrating technical competence, we earn the right to speak to engineers not as activists or theorists, but rather as an 'Institute' of fellow travellers, indistinguishable in many respects from the research organisations where our audience toils every day. Our projects are presented as 'research findings' at university lectures and technical conferences, and are reported on in engineering journals and trade publications. Our critique of engineering practice thus comes from within engineering culture, and is given material weight by the production of working artifacts.

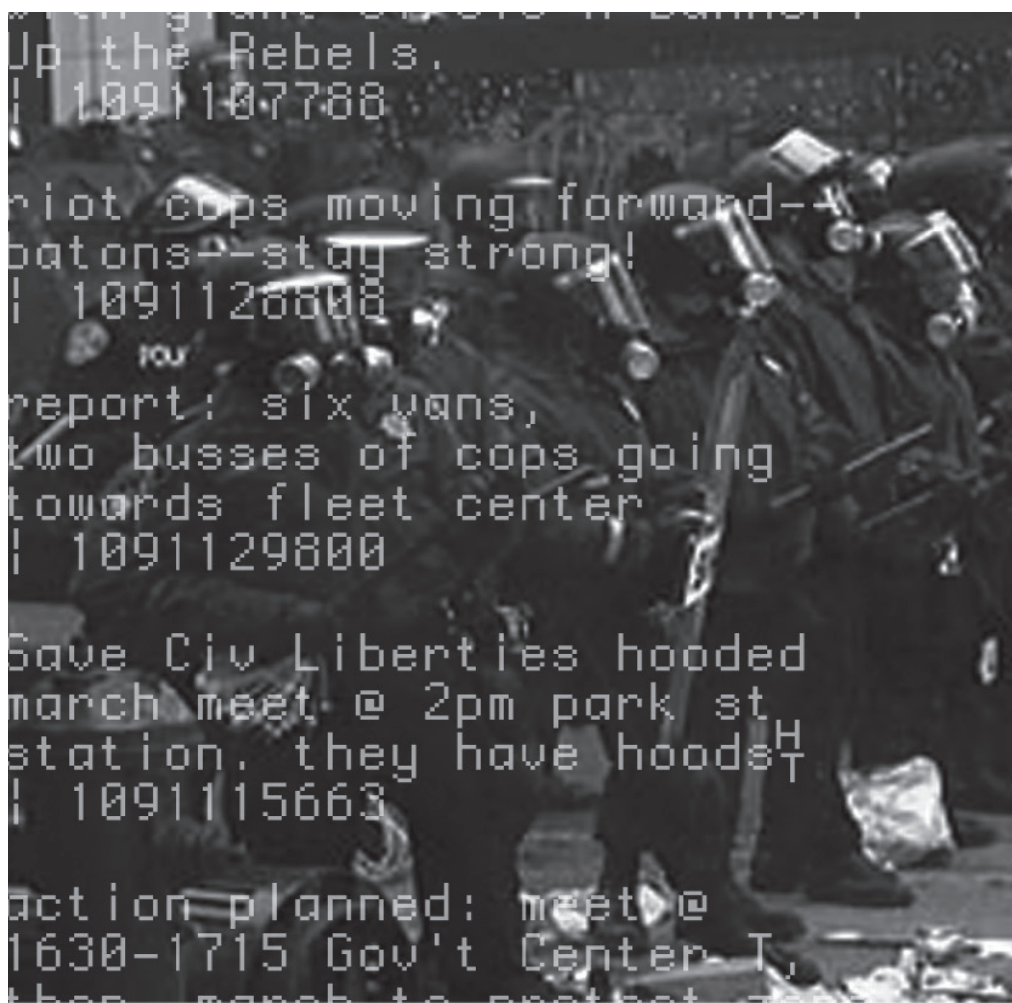
While there is a long history of artists and social theorists questioning relationships between technology and society, there is an equally long history of engineers ignoring art and social theory. By acting as engineers who address contentious political issues, we undermine the normalised ambivalence that characterises engineering practice. The works thus act as Trojan horses, carrying our critique through the gates of detachment that guard engineers against taking responsibility for the products of their labour. In lieu of ambivalence, we offer the engineering community the image of an 'engaged engineering' that works diligently in the service of freedom and human dignity, and takes responsibility for the world it helps create.



Figure 1: GraffitiWriter (1999)



*Figure 2: Little Brother (1999)*



# TXTmob

*"nw mor thn evr"*

[www.txtmob.com](http://www.txtmob.com)



Figure 3: TXTmob (2004)





Figure 4: iSee (2002)

**REFERENCES:**

CoEE (Code of Ethics for Engineers) (2003) National Society of Professional Engineers.

Critical Art Ensemble and Institute for Applied Autonomy (2001) 'Contestational Robotics', in Critical Art Ensemble (eds.) *Digital Resistance: Explorations in Tactical Media*, New York: Autonomedia.

DARPA (Defense Advanced Research Projects Agency) (2004) Mission and Overview <<http://www.darpa.mil/body/mission.html>>, accessed on 24.12.04.

Andrew Feenberg (1991) *Critical Theory of Technology*, New York: Oxford University Press.

J.E. (Tim) Holt (1997) 'On the Nature of Mechanical Engineering Work - An Engineering Ethos', in *The International Journal of Engineering Education*, 12(5).

Joseph Weizenbaum (1976) *Computer Power and Human Reason: From Judgement to Calculation*, San Francisco: W.H. Freeman.

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### FILTERED LIST:

- **XBox**

The Xbox is Microsoft's attempt at breaking the video games market and has been heavily subsidised since its release in 2001 (Estimated Production Cost: \$375, Street Cost: \$200). Utilising hardware that is closer to a desktop PC than any of the other major consoles, a hard disk as standard being the most important aspect, the Xbox has been subject to the largest number of Mods of all the technologies on this list. The most important of which include:

<http://xboxmediacenter.com> (a GNU/GPL multimedia player for chipped Xboxes)

<http://www.xbox-linux.org/Download> (several Linux distributions, to which this page is a guide)

<http://bit.bibbik.com/> (a version of the PVR software MythTV for the Xbox)

As well as amateur Mods, the Xbox has also been the target of several commercial Mods including the FriendTech DreamX machines and chipped machines being sold with several emulators and over 200 game ROMs from other consoles pre-installed. Each of these Mods undermine Microsoft's aggressive attempts to dominate the operating system, home media centre and video games markets.

- **Mobile/Cellphone**

As usage proliferates in places such as India and the Middle East, the mobile phone has become another prolific symbol of globalisation. Through both normal usage and appropriation this spread is having a surprisingly complex

political effect. On one hand, effects such as forcing Saudi Arabia's abandonment of a ban on camera phones and the spread of multinational brands can be seen as globalising. On the other hand, however, the mobile is allegedly responsible for the anonymous communication of anti-Western terrorist networks. But, perhaps, the most powerful use of the mobile phone yet comes through its appropriation into the perfect remote bomb detonator. Used in Iraq, Israel and Madrid, the cost, reliability and simplicity of a mobile phone combined with explosives is most definitely not a form of usage intended by its manufacturers but is perhaps a consequence of global capitalism all the same.

<http://littlegreenfootballs.com/weblog/?entry=1492&only=yes>

- **Robotic Toys**

Shunning the expensive Sony Aibo (which carries an interesting case of appropriation itself), the Bureau of Inverse Technology's (B.I.T.) Feral Robotic Dogs project is an ongoing effort to document and publish methods of upgrading the many different robotic dogs sold as toys so that they can be used with more serious applications. Using the cheap Megabyte One, the B.I.T. workshops have already produced robotic dogs that 'sniff' out depleted Uranium and other toxic by-products of industrial manufacture. All information on how to carry out these upgrades are available at the Feral Robotic Dogs website:

<http://xdesign.ucsd.edu/feralrobots/>

- **iPod Linux**

The iPod Linux project poses an interesting case of consumer appropriation for control. Apple, despite having one of the most open DRM (Digital Rights Management) policies with iTunes, restricts the iPod to playing only MP3, AAC and WAV file formats and recording in mono at a greatly reduced sample rate of 8kHz which also requires extra hardware. iPod Linux, however, is aiming to allow the playback of additional formats (e.g. OGG Vorbis) and already has a 44kHz recording function in beta form. Questions arise as to where users stand legally when non-destructively modifying an owned product, and whether Apple will act to try and stop further development or recapture this open research and development as part of their sophisticated marketing strategies.

<http://www.ipodlinux.org/>

- **Tivo**

Through appropriation, the Tivo Personal Video Recorder (PVR) has changed how many people without access to higher priced hardware or services consume television. By installing extra software on the Tivo, recorded programs can be transferred to a computer (this is now offered legally by TivoGo if you don't mind the DRM) and re-encoded. Through this process and the Bittorrent file sharing protocol many American TV series have become available on the internet before release in other countries. The UK has recently been shown to be the largest downloader of pirated TV shows making up 18% of the traffic. Software is also starting to appear that mimics a PVR but uses Bittorrent sites as its source rather than the TV networks. Even existing Tivo users are using the Bittorrent posts of their favourite shows if the networks schedule two shows head to head, one is recorded on the Tivo and the second downloaded. Despite largely creating the market, Tivo is now facing steep competition from other PVR manufacturers in both legitimate and appropriation markets.

**Note:** As suspected, TivoGo's DRM encryption that stops the transcoding of recorded files has now been cracked allowing the re-encoding of files into non-DRM files. See the last link below for instructions.

<http://www.tivo.com>  
<http://www.techstorm.net/tivo/extractionmpeg.html>  
<http://www.connectedhomenet.com/HomeTheater/Articles/Articles/Index.cfm?ArticleID=42708&pg=2>  
<http://tivo.3obelow.com/jdouglass/>  
<http://www.trilight.com/dvdguides/tivo/DVDLab.htm>  
<http://news.bbc.co.uk/2/hi/technology/4276255.stm>  
<http://www.gigaom.com/2005/02/19/how-to-save-tivo/>  
<http://www.evillabs.net/tivo/>

- **HDTV**

In 2003 the U.S. Federal Communications Commission published a mandate stating that all HDTV (High Density Television) Cable Tuners must be fitted with a Firewire (IEEE 1394) interface. As most modern computers (especially Apple Macs) also come with the same interface, work on making a computer act as a HDTV recorder began - this was spurred on by the fact that as HDTV is digital it cannot be recorded using a normal VCR. Interestingly, Apple also made available for download a simple HDTV recording application in their Firewire Software Development Kit. In order to stop the redistribution of HDTV content via the internet, as pioneered by Tivo

users for non-HD TV, the Broadcast Flag was born - a simple tag that means HDTV programs can be marked as non-recordable or copy once. These tags cause the HDTV tuner to encrypt the broadcast using 5C encryption so that only a 5C compliant device is able to display the recording. As computers are not 5C compliant the only option for recording most HDTV remains a standalone D-VHS recorder. The debate over whether the Broadcast Flag should be mandatory continues at the U.S. Appeals panel.

[http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-03-225A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-225A1.pdf)  
<http://www.avsforum.com/avs-vb/showthread.php?s=&threadid=386740>  
<http://www.eff.org/IP/Video/HDTV/>

- **Barcodes**

Re-Code's appropriation of the humble barcode was an attempt to highlight corporate crime through a humorous parody of Priceline.com's 'name your own price' website (see DATA browser 01 for more on this). Consumers could use the website to print out replacement barcodes for goods they believed were overpriced. Armed with their replacement barcodes, consumers could cover a product's real barcode and check out, preferably using a self-service checkout. Despite the creators of Re-Code being under threat from Wal-mart attorneys and suspending their site's service a simple Google search for 'Cracking Barcodes' shows that the techniques used by Re-Code are still available and in use.

<http://www.re-code.com>  
[http://www.tolse.com/en/hack/magnetic\\_stripes\\_and\\_other\\_data\\_formats/161810.html](http://www.tolse.com/en/hack/magnetic_stripes_and_other_data_formats/161810.html)  
<http://www.addict3d.org/index.php?page=viewarticle&type=security&ID=359>

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# THE PRODUCER AS POWER USER

Pit Schultz

- + 'The apparatus will be the better the more consumers it brings in contact with the production process - in short, the more readers or spectators it turns into collaborators.' (Benjamin)<sup>1</sup>

## 1

Within the circumstances of today's media networks it is impossible to not produce.<sup>2</sup> The classical dichotomy of production and consumption has been melted down by the circuits of communication and given birth to what marketing calls *the prosumer*.<sup>3</sup> Also known as *power user*,<sup>4</sup> neither professional nor amateur, neither hobbyist nor self-employed, between sofa and kitchen table, sometimes expert, sometimes dilettante, leaving the suburbs and moving to the city centres or the countryside, using trains and airplanes but not owning a car.<sup>5</sup> Living from project to project and shifting between unemployment and immediate wealth, the power user has left the factories and office buildings long ago to stay home and be the post-industrial anti-hero. On the thin surface of the heavy layers of well developed *old technologies*,<sup>6</sup> this prototype of the *knowledge worker*<sup>7</sup> grew up to become a collective role model *for the rest of us* and began to transform the boundaries of industrial labour, turning it into an ambiguous field of totalised work ethics.<sup>8</sup> Everyone is a power user now, dependent on the degree of participation in the global communication apparatus.

## 2

Through the intensified use of the networked computer, the subjectivity of the power user colonises space as far as the networks go.<sup>9</sup> *Being digital*<sup>10</sup> is constituted by an auto-referential mode of production which has transformed the workplace into a permanent state of mind, organised into thin slices of valuable work time. Like a CPU, the brain now functions as the ultimate desktop<sup>11</sup> where every thought might be useful and therefore needs to be recorded to be organised better. With genetics, the code of life has become a commodity, and the power user gains access to her ultimate eugenic self-optimisation, hacking the body-machine.<sup>12</sup> This pattern of total productivity is not only defined by the success of its results but also by the entirety in which it dominates everyday living standards and permeates every aspect of a *life on the screen*.<sup>13</sup> There are areas of optimisation, and areas of contemplation, but one is never free of production, of having to communicate and report, of having to learn to embrace new standards; or leaving trails of usage, just to be able to take part in the global production of affective and intellectual labour<sup>14</sup> and subjectify according to the expected profits.<sup>15</sup>

## 3

Consuming power and being consumed by it, the power user reproduces the force fields of the network, as well as being effected and formed by them. In the literal sense of the word, the power user takes more from a certain power than others: she might be a *heavy user*, a *hardcore gamer*, or a *machine addict*, a *linux-hacker*, driven by a desire to know and to gain control over the power which in reverse is controlling her. What distinguishes power users from average users or uninitiated *newbies* is the depth of practical experience with the relatively unknown and unsystematised areas of technification. This knowledge is uncertain by definition; it mostly centres around extending *administrative control*, and establishes a semi-stable status of *alpha testing*, where idea and implementation are in a maximum flux of exchange, and the gain and loss of control can be repeatedly re-experienced. As a gardener of her own *media archive*,<sup>16</sup> the power user begins with the cultivation of a private archaeology



of knowledge. It is here, in the enclosure of *electronic loneliness*,<sup>17</sup> where the mediation with technical changes takes place at first, and only from this point on, the power user is paradoxically able to re-enter the gift economy<sup>18</sup> of the public domain again.

#### 4

At the forefront of the still ongoing cybernetic modernisation, the power user serves as an unpaid research and development unit, as a mediator to popular media culture, and a sensitive prototype of sociotechnical exploration. In many cases the power user is self-trained, almost making a living out of her skills, beyond productivity in an industrial sense, without being responsible for a specific product or task. She is primarily dedicated to her own individualisation, the customisation of the extended self in relation to other power users, in the form of an ongoing *system configuration*. Usually not too much involved as a *developer*, the power user actively contributes to the deployment of software tools by finding new uses for them, or documenting errors, and therefore inscribing herself into the collective process. She lives on the back end and insides of *cybernetic circuitry*, and constantly configures and expands it as essential parts of the household. On behalf of technological determinism, it is easy to think it's cool to be a power user, but there is a price to pay: unique authorship dissolves in the technical reproduction of subjectivity, into a set of management strategies. Entering a new era of industrialisation, the craftsmanship of the *digital artisan*<sup>19</sup> makes space for the customisation skills of the power user, within a more and more standardised and modularised corporate information service environment.<sup>20</sup>

#### 5

Becoming an expert, functioning between the average user and the I.T. professional, the power user marks a transitional state of computer literacy, which socially buffers the imperfections of current technologies, but also generates a type of *sleeping knowledge* in which an economic potential is generated without the need for financial rewards. Power users form the waiting

reserve of unpaid labour in a networked environment of digital knowledge production.<sup>21</sup> Their specialisation through intensified usage is a model for other computerised work areas, such as film editing, music production, game development or journalistic production. The unpaid labour of the power user is not only legitimated through the need for lifelong learning or the chance to gain access to specialised expertise, but mainly by social reputation, deriving from the tangible and intangible aspects of the production of *life quality*. By putting themselves into the voluntary service of new media technologies, they gain more *media freedom*.<sup>22</sup> For the maximisation of this yet unbound productivity, the access to the means of production needs to be as universal and open as possible.

## 6

The defining threshold which sets the entry line between the unpaid labour of the power user and the highly paid services of the knowledge expert, is no longer entirely constructed by the traditional institutions of knowledge production, such as the university. The global network itself became the educational environment for those without direct access to the institutions. The involvement in *free and open projects*, from where the power user not only builds up a reputation,<sup>23</sup> but also gains crucial skills, can easily equal the value of an academic degree. This type of distributed expert knowledge is of a more pragmatic and immanent kind, more webbed into social fabrics, trial and error and *thick description*,<sup>24</sup> than the one describable in handbooks and how-to guides. While the quality of official education is suffering pressure from the mass production of academic experts, the massive self-education of power users creates a new and growing class of *google intellectuals*,<sup>25</sup> who can only know as much as is available in the open, establishing a new economy of words from the *bottom up*. What power users also produce is the negativity of demand: missing links, feature requests, unreachable goals and unrealised ideas. Power users form a *ghost army* of pricelessness, in a last big battle of the *copywars*,<sup>26</sup> where academic science might become dependent on them.

## 7

The order which controls the life of the power user derives from a computerised form of self-discipline. In exchange for her submission she is granted access to the platforms of free exchange. Her daily routines are structured by networked environments, the rhythm of digital media such as mobile phones, news blogs, the permanent build-up of private archives, interrupted only by technical malfunctions, which are happily accepted as welcome challenges for individual creativity. The power user is a voluntary file clerk in the global open archives; her singularity is embedded into a truly encyclopaedic digital commons.<sup>27</sup> Her contributions to the means of production are a necessary part of the general media architecture, which she keeps alive as a cultural infrastructure. To be productive, her contributions, private or public, critical or affirmative, need to remain *free gifts* to generate the surplus on which other advanced services and enclosures can be built upon.<sup>28</sup> The ambiguity of this low end info-communism in the eye of the hurricane of world wide integrated capitalism, has become one of the major resources of the neo-liberal knowledge economy and can be described as both revolutionary and reactionary.

## 8

Riding the top of the gaussian curve of social consensus production, the power user does not mark any source of originality, but serves as a redirector, a filter, amplifier, repeater, reporter and commentator of actualities. Travelling possibility space, she is processing and commenting upon news, *in collaboration* with other power users, as a fabrication of facts, to cover the structural uncertainty of the media society, e.g. the social risk to fall off the edges or stay behind. She says: 'I post so I am', frequently actualising her binary existence by publishing and posting, so more links go to and from her name and address. The power user dreams of the singularity of the author, which she gave up for a passion for engineering.<sup>29</sup> Interestingly, the cross referencing of digital citation coincides with a growing production of books and papers, as if the material carrier would provide a better insurance against future memory loss and individual disappearance. The accumulative result of *panic publishing* is the establishment

of a *radical mediocrity*<sup>30</sup> in intellectual production, where more and more redundant work is produced for the mere sake of the legitimization of the authors. In this process of constant enclosures, the new author turns into a journalist of everything, an entrepreneur with himself as the main product, a frequent *chronicist* of his own biography, an under-cover con-artist and encyclopaedic archive gardener who can be hired for anything which might generate temporary market interests.

## 9

As the power user forms a quasi-autonomous unit with her machines, the quality of her production is at first only measured by herself. The tasks of administration and maintaining, self-employment and constant re-education, configuring and repairing, testing and improving, applies at first only to the systems of an extended self, not driven by an autopoietic 'l'art pour l'art' but a self-sufficient digital craftsmanship aiming at the expansion and optimisation of the entirety of the productive process through the reconfigurations, explorations and improvements of the individual units. The power user is also a power consumer: she participates in an actual economy of cash to enjoy the updating of her gadgetry, credit card payments of flights and services, of storage and bandwidth costs. Checking prices online and evaluating the potential of new goods, reselling used equipment on online auctions, recommending and even customising to find new uses. The legal greyzones populated by power users, are an expression of opportunity and parasitical subversion of brutal market growth. By joining peer-to-peer networks or fan-groups and exchanging warez and tips and tricks, the power user enhances the mere distribution of commodities, and turns them into a participatory, economically reproductive form of *digital lifestyle*.

## 10

As the permanent exchange between sender and receiver, between server and client, has become the primary source of digital productivity, the power user has to integrate them in her *ego design*<sup>31</sup> process. Constructed as a leaking container of commercial cultural content, peer-to-peer networks become sources of

‘shared identity’. Driven by their hunter-gatherer instincts, power users cannot get enough of free content; they are liberal enough to traverse different levels of resistant production, and reprocess minority politics and psychosocial delinquency as ‘hybrid identities’, which are generously hosted by the system for the sake of diversity and innovation. From the other side, jurisdiction and commerce reestablishes the order of individual rights and their restrictions. Power users are the organic intellectuals<sup>32</sup> who work *between the frontlines* on social implementations of upcoming standards, and expand and test their acceptability. They also socially develop new work disciplines, job models, and cultural killer applications. The model of legitimation of the double bind of this emerging *hacker class*<sup>33</sup> is symptomatic for the rest of society. In order to modulate and redirect power relations, the power user has to legitimate her access to power as a critical one. By referring to the forces of technical revolution and the crisis it leads to, she is betting on tactical reformism as an opportunity for individual freedom. At the centre of this double bind between technology and capitalism stands the relation to property and authorship, in which the power user works both on her own dissolution as well as re-establishment.

## 11

There are two different types of power users, affirmative ones and critical ones. The affirmative power user operates as a singularised entity of intensified use and micro-self-publishing, who then, by learning more, join flocks of loose and interlinked groupings, and develops a sense of togetherness. Dependent on the degree of desire for such a community, she joins the forming of sub-groups, where in an antagonism against and within the host system, she turns into a critic. As a critical opponent, she supports the *community* of the like-minded with plans to change the host system, and the critique becomes an expression of the growing self-awareness of her own class.<sup>34</sup> As an affirmative member she chooses competition in favour of individual optimisation and uses the integration for means of efficiency. It is rare that the power user is not *critical* and *affirmative* at once and it is here, in the social field, where power unfolds with the most forceful ruptures, ready to be reprocessed into its symbolic forms

again.<sup>35</sup> Finally, unable to distinguish between *me* and *we*, the power user speaks of herself in plural.<sup>36</sup> Tactically transmutating between multiplicity and singularity, her oscillating condition of mind has become identical with the modes of production which define her.

## 12

There are no sovereign media.<sup>37</sup> The more excluded or invisible a group, the more interesting it becomes for representation. The more violent the fight, the more self-destructively it resists representation, the more difference it produces, so the media sets its focus of investigation to the maximum. Terrorism is the continuation of communication with other means to send 'messages without words'.<sup>38</sup> Total mediation does not allow any outside, any existence in the shadows; it only allows unrepresentable noise, chaos, decay and disintegration - or a peaceful life in a subordinated normality. Therefore the line of the outside becomes the centre of attention. Focusing on the extremes of catastrophe and violence, the uncanny chaos becomes symbolised and fixed in a commodity value exchange, and economy ultimately turns into a matter of faith. The power user serves as an active agent of mediation: she works on the overlappings of old and new electric media, and tests the boundaries of the new interfaces between internet, television, radio, telephony and other gadgetry for a possible answer.<sup>39</sup> As free capitalism enlightened by free media aims at the total domination of space and time, the power user delivers to the all-seeing eye, as it operates on its surface through image media, to objectify what it 'sees', and what it sees is what you want.<sup>40</sup>

## 13

The expected growth of *open archives* at the *non profit* end of the spectrum exceeds commercial growth by orders of magnitude<sup>41</sup> because the intensity of exchange is much larger than in a closed learning environment. The power user marks a change of the function of the author in such a collectified mode of production and is described by a prolonged list of *last authors*.<sup>42</sup> Any enterprise in the future which operates on the basis of knowledge production will have to

rely partly on 'free and open' resources, as a foundation of their business power. As a *contributor* the power user remixes modes of production, consumption and distribution, maximising communicative participation. Therefore the power user becomes the new ideal of education in a democratic media culture.<sup>43</sup> This new type of authorship is more factory-like, more collective, based on an imaginary predictability of 'free will'<sup>44</sup> and constant competition, a combination of the dreams of info-capitalism and soviet constructivism.<sup>45</sup> Its openings and enclosures are dialectically entangled; none of them exists without the other.

#### 14

The power user is the opposite of the hacker; she does not want to get 'inside' or 'outside' the system, but stays at her place to deepen her knowledge. Only the collectivisation of these singular 'boreholes of insight' overcomes the traps of a production process which collapses in the final goal of a fabricated individualism, as an advanced part of capitalistic production, and the establishment of a radically mediocre authorship within very constrained and predictable boundaries. The second criteria of change is the equivalent of what was called consciousness before, but is today rather a media process than a psychological one. In effect, the media architecture of the *information and communication* infrastructure<sup>46</sup> has replaced the discursive function of the psychic apparatus, and clarity can only be regained in the plurality of a *parliament of things*. This is the radical conversion of Descartes' 'cogito', and the first trials of a truly planetary politics are still tinkering around how to outsmart the 'other'.<sup>47</sup> The current defence of conservative fundamentalism can only be a phase of transition and the symbolic death in which capitalistic production culminates; it cannot remain a means in itself. Driven by the will to knowledge,<sup>48</sup> the power user will ultimately empower herself by giving the power of knowledge away. The more intellectual property is collectivised, the more sources are open,<sup>49</sup> the more a critical mass of free knowledge becomes possible.

## NOTES:

1. Benjamin's 'The Author as Producer', republished in Harrison & Wood (1992 [1934]: 484).
2. Berthold Brecht 'Der Dreigroschenprozess': 'To tell to the mind worker that he would be free to forfeit the new means of production, would mean to direct him to a freedom outside of the process of production.' (1966 [1931]: 176; my trans.); also compare: 'Axiom I: one cannot not communicate' (Watzlawick et al. 1967); also: 'Every communication has a content and a relationship aspect such that the latter defines the former and is therefore metacommunication.' Axiom II is currently exploited in social software systems.
3. 'Some of the richest and largest corporations in the world are also for their own technological and economic reasons accelerating the rise of the prosumer.' (Toffler 1980: 270)  
'The customer is now a participant in the production process. One way or another, we recruit customers to become our allies and in effect, co-producers. The customer now is what we call a prosumer. [...] What's happening is a shift toward consumption in which the lines have blurred between producer and consumer or customer.' (interview with Alvin and Heidi Toffler by James Daly, Business 2.0, 15 Sept, 2000).
4. The power user, defined in various jargon glossaries as: 'a computer user who needs the fastest and most powerful computers available'; 'someone who's read the manual all the way through once'; first mentioned in 1985: 'I'm a power user - my computer draws a kilowatt.' (Newsgroups: net.micro, 26 July 85); 'the power user can have a multiple window connection to a host. The casual user can be supported by a macro capability to provide desired functions from the host.' (Newsgroups: fa.info-mac, 1 July 1985); Raymond M. Glath: 'Level 1 - "Typical End User"? (Basic knowledge of using applications and DOS commands). Level 2 - "Power User"? (Knowledge of DOS Command processor, Hardware functions, BASIC programming, etc.). Level 3 - "Applications Programmer"? (Knowledge of programming languages and DOS service calls). Level 4 - "Systems Engineer"? (Knowledge of DOS and Hardware internal functions). Level 5 - "Computer Science Professor that develops viruses for research purposes?"' (1988) <<http://www.textfiles.com/virus/glath.vir>>.
5. See Pritchett's Mindshift: The Employee Handbook for Understanding the Changing World of Work (1996).
6. See Carolyn Marvin's When Old Technologies Were New (1990).
7. '[...]in the knowledge society the employees, that is knowledge workers, again own the tools of production' (Drucker 1994).
8. See Max Weber's The Protestant Ethic and the Spirit of Capitalism (1930).
9. See Felix Guattari's 'De la production de subjectivité' (1986). The concept is also central to Hardt & Negri's Empire (2000: 277) and Lazzarato's 'Immaterial Labour' (1996: 137). Similarly, Negri states: 'It is the production of oneself with others in struggles, it is innovation, the invention of languages and networks, it is to produce and to reappropriate the value of living labour. It is to booby-trap capitalism from within.' (2000)  
Michel Foucault, Pontifical Catholic University of Rio de Janeiro in May 1973, is quoted by Mark Coté as saying: 'The fact is, capitalism penetrates much more deeply into our existence. [...] A web of microscopic, capillary political power had to be established at the level of man's very existence, attaching men to the production apparatus, while making them into agents of production, into workers. [...] There is no hyperprofit without an infrapower...[which refers not to a state apparatus, or to the class in power, but to a whole set of little powers, of little institutions situated at the lowest level.]'
10. 'In being digital I am me, not a statistical subset [...] True personalization is now upon us [...] The post-information age is about acquaintance over time: machines' understanding individuals with the same degree of subtlety (or more than) we can expect from other human beings.' (Negroponte 1995: 164)



11. 'Consider a future device for individual use, which is a sort of mechanized private file and library [...] a device in which an individual stores all his books, records, and communications [...] It is an enlarged intimate supplement to his memory [...] Otherwise it looks like an ordinary desk.' (Bush 1945)
12. 'Eugenics is a perfect complement to the capitalist political-economic imperative of authoritarian control through increased rationalization of culture.' (Critical Art Ensemble 1998: 119)  
'If the more utopian political aspects of the PC and video were never realized, biotechnology will probably never even have any such aspects on a general collective level, for the simple reason that the means of production will not be given to the public.' (Critical Art Ensemble 2002: 120)
13. 'There is something else that keeps me at the screen. I feel pressure from a machine that seems itself to be perfect and leaves no one and no other thing but me to blame [...] The computer's holding power is a phenomenon frequently referred to in terms associated with drug addiction. It is striking that the word "user" is associated with computers and drugs.' (Turkle 1995: 29)
14. 'The particularity of the commodity produced through immaterial labor (its essential use value being given by its value as informational and cultural content) consists in the fact that it is not destroyed in the act of consumption, but rather it enlarges, transforms, and creates the ideological and cultural environment of the consumer.' (Lazzarato 1996: 137)
15. System/Environment: the purification of the knowledge production process leads to a growing amount of attended 'waste material' which leads to the question of the information commons. James Boyles' 'A Politics of Intellectual Property: Environmentalism For the Net?' (1997) was highly influential for Lawrence Lessig's approach. The systemic or 'green' approach has been forgotten in favour of a liberal politics for openness and innovation.
16. 'The pure thinking of yore [sic] has now become a purifying thinking, obsessed with the administration of its own mindset.' (Adilkno 1998 [1992]) <<http://thing.desk.nl/bilwet/adilkno/TheMediaArchive/50.txt>>.
17. 'Change the world, stay at home.' Adilkno, 'Electronic Loneliness' (1998 [1992]) <<http://thing.desk.nl/bilwet/adilkno/TheMediaArchive/38.txt>>.
18. 'Power, of which this is always and everywhere the definition, resides in the act of giving without being given.' (Baudrillard 1993 [1976]: 40)
19. See Richard Barbrook & Pit Schultz's 'Digital Artisan Manifesto' (1999).
20. 'The IT-service market is developing itself from artisanship to mass production.' ('Gartner Briefing: IT-services become mass products', Computerwoche, 3 October 2005, my trans.).
21. See 'The Automation of Higher Education' (Noble 1997).
22. 'As a central part of their campaign for more market competition, the neo-liberals created a new definition of media freedom. Echoing the prophecies of the futurologists, they claimed that the application of their deregulation and privatisation policies within the electronic media would encourage the rapid construction of an interactive cable network.' (Barbrook 1995)
23. 'Reputation, similarly, is a measure of the value placed upon certain producer-consumers - and their products - by others. The flow and interaction of reputation is a measure of the health of the entire cooking-pot economy.' (Aiyer Ghosh 1996)
24. 'Cultural analysis is intrinsically incomplete. And, worse than that, the more deeply it goes the less complete it is.' (Geertz 1973: 29; 'thick description' is a term borrowed from Ryle 1949).

25. A term introduced by Diana McCarty and Hans-Christian Dany for extensively using search engines instead of one's own head.
26. Copywars? <<http://www.eff.org/IP/>>.
27. 'You will be obliged to get the assistance of a large number of men who belong to different classes, priceless men, but to whom the gates of the academies are nonetheless closed because of their social station. All the members of these learned societies are more than is needed for a single object of human science; all the societies together are not sufficient for a science of man in general.' (Diderot ~1777)
28. The potlatch is also a means of social hierarchisation; only those who can give much, are powerful.
29. Compare Benjamin's question to the author as engineer: 'Does he achieve to support the socialisation of the means of production?'.
30. 'Henk Oosterling argues that art has become "radically mediocre". This sounds like a rejection of contemporary art, but he means it literally: middling, medium. According to Oosterling, art is not an activity that takes place separately from society, art represents an interest, a being-in-the-middle. Oosterling's vision is marked by a media perspective: we ourselves, he says, have also become radically mediocre; we have allowed ourselves to be embraced by the media with which we communicate and transport ourselves. In this view, neither art nor the individual are autonomous, they are parts of the 'inter', they consist of the connections that they are concerned with.' (Altena 2000)
31. See Stefan Geene's Money Aided Ich-Design (1998).
32. 'Every social group creates together with itself, organically, one or more strata of intellectuals which give it homogeneity and an awareness of its own function not only in the economic but also in the social and political fields. The capitalist entrepreneur creates alongside himself the industrial technician, the specialist in political economy, the organisers of a new culture, of a new legal system...' (Gramsci 1994: 217)  
'All men are intellectuals... but not all men have in society the function of intellectuals [...] in any physical work, even the most degraded and mechanical, there exists a minimum of technical qualification, that is, a minimum of creative intellectual activity.' (Gramsci 1994: 217-18)
33. 'Hacking is the production of production. The hack produces a production of a new kind, which has as its result a singular and unique product, and a singular and unique producer.' (Wark 2004)
34. See Roberto Verzola's 'Cyberlords: The Rentier Class of the Information Sector' (1996).
35. 'Power is coextensive with the social body; there are no spaces of primal liberty between the meshes of its network.' (Foucault 1980: 142)
36. See Richard Sennett's 'We, the Dangerous Pronoun' (1998).
37. 'The sovereign media insulate themselves against the hyperculture. They seek no connection; they disconnect.' (Adilkno 1998)
38. 'Our people in Arabia will send him messages without words because he [the president] does not understand words' (Interview on CNN, Peter Arnett with Osama bin Laden, 11 May 1997).
39. 'Now, the totality of the existing architecture of the media founds itself on this latter definition: they are what always prevents response, making all processes of exchange impossible (except in the various forms of response simulation, themselves integrated in the transmission process, thus leaving the unilateral nature of the communication intact). This is the real

abstraction of the media. And the system of social control and power is rooted in it.' (Baudrillard 1981 [1972]: 169).

40. See Hakim Bey's *The Obelisk* (1997).

41. '[A] single development, in either technology or management technique, which by itself promises even one order of magnitude improvement in productivity, in reliability, in simplicity [of software projects.]' (Brooks 2005 [1986]); Compare the Wikipedia.org press release of February 2004: 'the surge in growth has [...] resulted in Wikipedia.org surpassing Britannica.com, Infoplease.com and Encyclopedia.com in terms of its Internet traffic rank and has placed Wikipedia.org firmly within the top 1,000 websites.'

42. 'Mallarme, Benjamin ('The Author as Producer'), Foucault ('What is an Author?') and Barthes ('The Death of the Author') all write on the erosion and/or disappearance of the author. But their writing had little effect on the disposition of author law. On the contrary, in law there is an enormous expansion of the definition of the author to include those doing dance, pantomime, cinema, photography, video, translations, softwares, databases, exhibitions... well, the culture we have is the one we deserve!' (email to author, from Kobe Matthys, January 2005).

43. See Olivier Marchart's *'Media Darkness'* (2003).

44. See Eric S. Raymond's *'Predictability, Computability, and Free Will'* (2004).

45. 'Everyone can and should ... introduce a maximum degree of precision, clear-cut contours, and purposefulness into the thing produced by him, just as dedicated specialists have until now, the form searchers, the workers of art. Advocates of the transformation of raw materials into a certain socially beneficial form, combined with the ability and the intensive search for the most meaningful form - this is what an "art for all" must comprise. Everyone should be an artist, a sublime master in the thing he is doing at a certain moment in time.' (Tretjakov 1972).

46. 'Space and Time... fall into their places as mere mental frameworks of our own constitution.' (Innis 1994 [1952]).

47. See the political process of deciding on Software Patents <<http://www.nosoftwarepatents.com/>>.

48. 'And only on this solidified, granitelike foundation of ignorance could knowledge rear itself hitherto, the will to knowledge on the foundation of a far more powerful will, the will to ignorance, to the uncertain, to the untrue! Not as its opposite, but - as its refinement!' (Nietzsche 1886)

49. Compare the doctrine of Intelligence Services lead by the principles of 'open source' (Björre 1995).

## REFERENCES:

Adilkno (1998 [1992]) Media Archive, New York: Autonomedia <<http://thing.desk.nl/bilwet/adilkno/TheMediaArchive/>>.

Arie Altena (2000) 'Radical Middelmatigheid', Boom, Amsterdam <<http://www.xs4all.nl/~ariealt/nonmodernity.html>>.

Richard Barbrook & Pit Schultz (1999) 'Digital Artisan Manifesto' <<http://www.ljudmila.org/nettime/zkp4/72.htm>>.

Richard Barbrook (1995) *Media Freedom: The Contradictions of Communications in the Age of Modernity*, London: Pluto Press.

Jean Baudrillard (1981 [1972]) 'Requiem For The Media', in *For a Critique of the Political Economy of the Sign*, St. Louis, Mo.: Telos.

Jean Baudrillard (1993 [1976]) *Symbolic Exchange and Death*, New York: Sage.  
Walter Benjamin (1992 [1934]), 'The Author as Producer', republished in Charles Harrison & Paul Wood (eds.) *Art in Theory 1900-1990: An Anthology of Changing Ideas*, Oxford: Blackwell.

Hakim Bey (1997) *The Obelisk* <<http://www.t0.or.at/hakimbey/obelisk.htm>>.

Major (Res.) Mats Björe (1995) 'Six Years of Open Source Information, Lessons Learned' <<http://www.osint.org/osq/v1n1/sixyears.htm>>.

James Boyle (1997) 'A Politics of Intellectual Property: Environmentalism For the Net?' <<http://james-boyle.com/>>.

Frederick P. Brooks Jr. (2005 [1986]) 'No Silver Bullet', in *Mythical Man-Month, Essays on Software Engineering*, Addison Wesley.

Vannevar Bush (1945) 'As We May Think', *The Atlantic Monthly*, July <<http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm>>.

Critical Art Ensemble (1998) *Flesh Machine: Cyborgs, Designer Babies, and New Eugenetic Consciousness*, New York: Autonomedia.

Critical Art Ensemble (2002) 'The Question of Access', in *Molecular Invasion*, New York: Autonomedia.

Denis Diderot (~1777) *Encyclopédie*, <<http://www.hti.umich.edu/d/did/>>.

Peter Drucker (1994) 'Knowledge Work and Knowledge Society: The Social Transformations of this Century', *The 1994 Edwin L. Godkin Lecture*, Harvard University, 4 May <[http://www.ksg.harvard.edu/ifactory/ksgpress/www/ksg\\_news/transcripts/drucklec.htm](http://www.ksg.harvard.edu/ifactory/ksgpress/www/ksg_news/transcripts/drucklec.htm)>.

Michel Foucault (1980) *Power/Knowledge*, New York: Pantheon.

Stefan Geene (1998) *Money Aided Ich-Design: Technologie, Subjektivität, Geld*, Berlin: BBooks.

Clifford Geertz (1973) 'Thick Description: Toward an Interpretative Theory of Culture', in *The Interpretation of Cultures*, New York: Basic Books

Rishab Aiyer Ghosh (1996) 'Cooking Pot Markets' <[http://www.firstmonday.org/issues/issue3\\_3/ghosh/](http://www.firstmonday.org/issues/issue3_3/ghosh/)>.

Antonio Gramsci (1994) 'Hegemony, Intellectuals and the State', in John Storey (ed.) *Cultural Theory and Popular Culture: A Reader*, New York: Harvester Wheatsheaf.

Félix Guattari (1986) 'De la production de subjectivité', *Chimere*, no. 4 <<http://www.revue-chimeres.org/pdf/04chi03.pdf>>; different from the chapter of the same title, in Félix Guattari (1995) *Chaosmosis. An Ethico-Aesthetic Paradigm*, Sydney: Power Institute.

Michael Hardt & Antonio Negri (2000) *Empire*, Cambridge, Mass: Harvard University Press.

Harold Innis (1994 [1952]) 'The Bias of Communication: The Problem of Space', in *The Bias of Communication*, Toronto: University of Toronto Press.

Maurizio Lazzarato (1996) 'Immaterial Labor', in Paolo Virno & Michael Hardt, *Radical Thought in Italy*, Minneapolis: University of Minnesota Press.

Oliver Marchart (2003) 'Media Darkness: Reflections on Public Space, Light and Conflict', in Tatiana Goryucheva & Eric Kluitenberg (eds.) *Debates & Credits - Media / Art / Public Domain*, Amsterdam: Uitgeverij De Balie.

Carolyn Marvin (1990) *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century*, Oxford: Oxford University Press.

Friedrich Nietzsche (1886) 'The Free Spirit', in *Beyond Good and Evil*, Project Gutenberg <<http://www.artpolitic.org/marx/reference/archive/nietzsche/1886/beyond-good-evil/>>.

Antonio Negri (2000) 'A Contribution on Foucault', from *Transformations of Work and Crisis of the Political Economy* seminar series, 9 October <<http://www.generation-online.org/p/fpnegri14.htm>>.

Nicholas Negroponte (1995) *Being Digital*, New York: Vintage.

David F. Noble (1997) 'Digital Diploma Mills, Part I. The Automation of Higher Education', <<http://communication.ucsd.edu/dl/ddm1.html>>.

Price Pritchett (1996) *Mindshift: The Employee Handbook for Understanding the Changing World of Work*, Plano: Pritchett & Associates.

Eric S. Raymond (2004) 'Predictability, Computability, and Free Will', 19 October <<http://esr.ibiblio.org/index.php?p=161>>.

Gilbert Ryle (1949) *The Concept of Mind*, Chicago: University of Chicago Press.

Sergej Tretjakov (1972) 'Die Arbeit des Schriftstellers. Aufsätze, Reportagen, Porträts', Rowohlt: Reinbek/Hamburg, in Gerald Raunig (2004) 'Grandparents of Interventionist Art, or Intervention in the Form. Rewriting Walter Benjamin's "Der Autor als Produzent"', EIPCP (European Institute for Progressive Cultural Policies) <<http://www.eipcp.net/>>.

Richard Sennett (1998) *The Corrosion of Character*, New York: W.W. Norton Press.

Alvin Toffler (1980) *The Third Wave: The Classic Study of Tomorrow*, New York: Bantam.

Sherry Turkle (1995) *Life on the Screen: Identity in the Age of the Internet*, New York: Simon and Schuster.

Roberto Verzola (1996) 'Cyberlords: The Rentier Class of the Information Sector', in *Towards a Political Economy of Information: Studies on the Information Economy*, Foundation for Nationalist Studies (FNS).

McKenzie Wark (2004) *A Hacker Manifesto*, Cambridge, Mass.: Harvard University Press.

Paul Watzlawick, Janet Beavin Bavelas, Donald D. Jackson (1967) *Pragmatics of Human Communication*, New York: W.W. Norton.

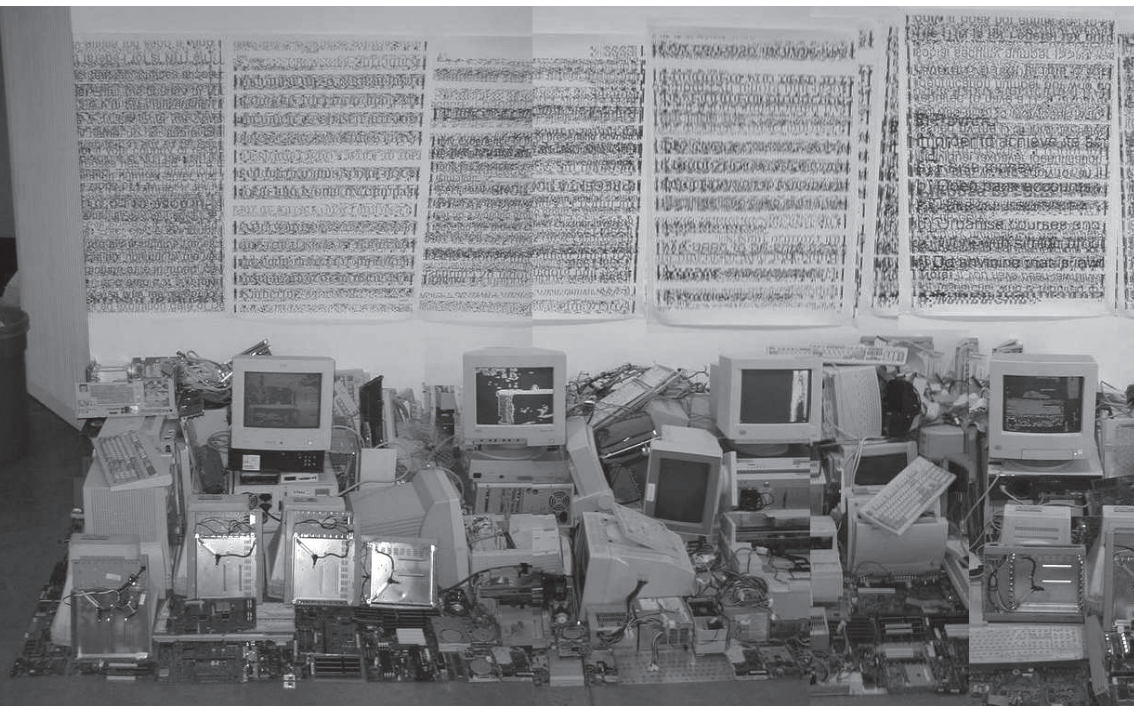
Max Weber (1930), *The Protestant Ethic and the Spirit of Capitalism*, London: Harper Collins.

# THE PROCESS IS THE PRODUCT

## Redundant Technology Initiative

- + In 1996 Redundant Technology Initiative financed their involvement with information communication technology with one simple decision: as a matter of policy they would only use technology that they could acquire for nothing. Their next problem was to reanimate their growing stockpile of trash computers. Choosing Linux, the free operating system, enabled them to create digital arts projects that drew in volunteers and attracted more donations of old equipment. In 2000, RTI opened 'Access Space' the UK's first Free Media Lab' - an open-access digital reuse centre where participants could learn, create and communicate online. Because the capital cost of the lab is next to nothing, the project is highly sustainable, and upgrades are free!

Redundant Technology Initiative do not see their exhibitions and artworks as 'final results', but as just one phase of a larger 'art process' which involves recycling, learning, raising awareness and inspiring other people to get involved. Access Space participants include many people who don't define themselves as 'artists' but nonetheless contribute skill and expertise to create vehicles for exploring and transmitting ideas. This way of working accepts no firm distinction between 'art' and 'other creative activity', nor between 'artist', 'activist' or 'creator'. But this is not new: at the beginning of the 20th century the Futurists and other art groups vigorously asserted the role of engaged artist as an agent of social change. Shortly thereafter, the new technology that so excited them was re-purposed for one of Europe's most disastrous and deadly wars. Currently, artists engaged

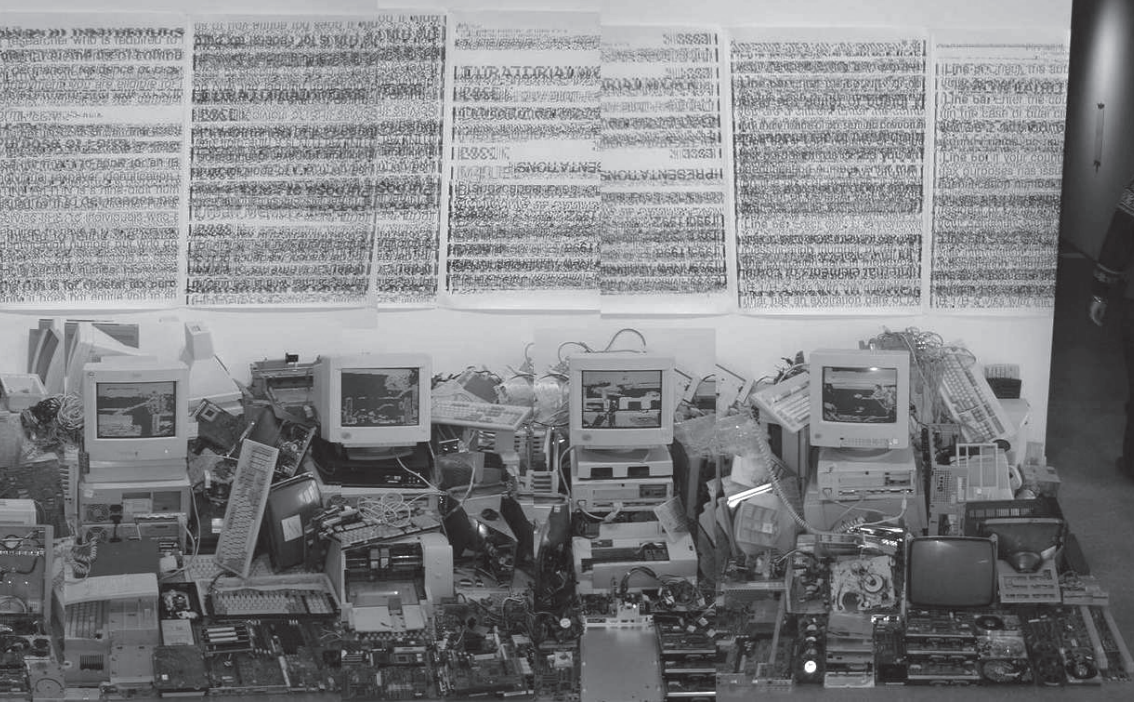


*'Futureproof' (2003)*

with networked technology are working in another hazardous environment, in which corporate, governmental and big-media interests are moving to annexe newly discovered tracts of independent territory.

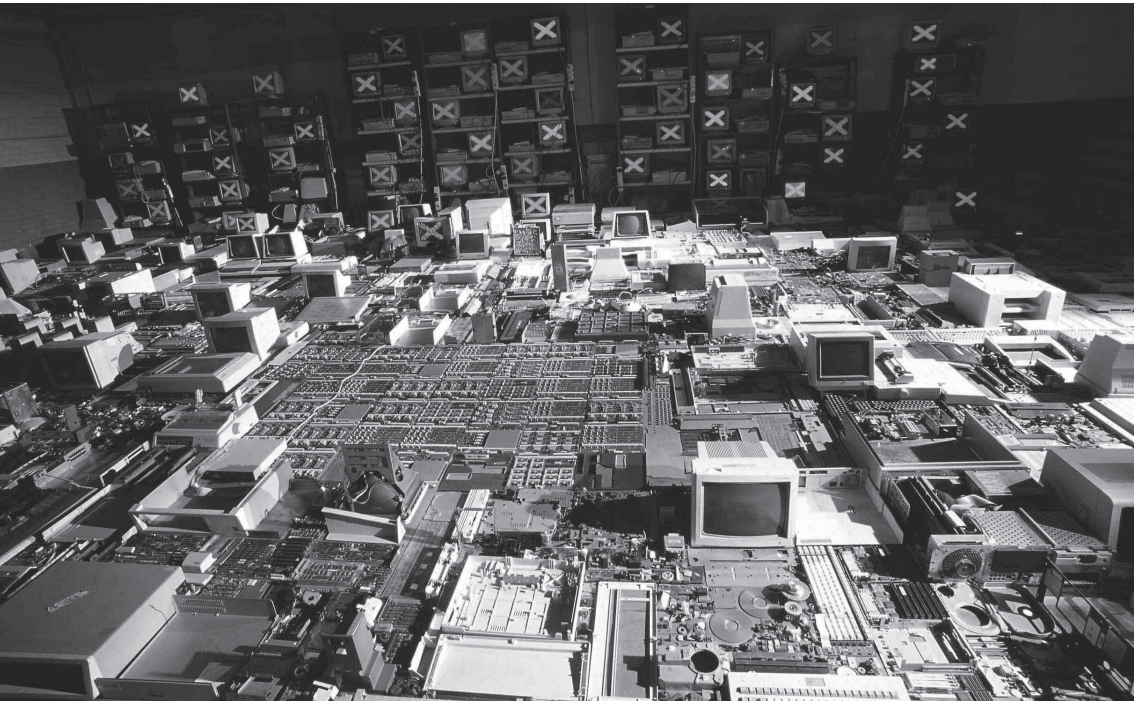
So what is this 'independent territory' that Access Space is concerned with, and why is it relevant *now*? Back in the early 1990s, there was a lot of enthusiasm for the creative and democratising potential of the internet - shortly followed by cynicism during the dot-com crash. But that cynicism was based on a lack of recognition of the creative and democratic potential of the internet and its users. In response, Access Space provides individuals with the opportunity to move from being an information consumer to an information producer. Linux, and the free software movement in general, is just one facet of this new opportunity.





Creative Commons too, encourages cultural producers to publish their work with GPL-like conditions attached.<sup>2</sup> However, there is opposition to this process. There are suggestions that Digital Rights Management may actually make it impossible for an individual to make and distribute their creative product on the net for free. Simply by being ‘unlocked’ that piece of data may automatically be flagged by future computing devices as ‘unsafe’ and ‘possibly illegal’. If the ‘Trusted Computing’<sup>3</sup> framework is widely adopted, it may be that your computer will *automatically delete* free information, without your conscious consent. The same goes, of course, for free software, free culture, and free speech. This really is an attempt to monetise the commons - to start charging each of us for what we already own: the opportunity to create and share culture. The way to ensure that ‘free culture’ is protected is to contribute to it - to make it so valuable that any device which can’t access it will be seen as worthless.





*'Redundant Array' installation (1998)*

**NOTES:**

1. RTI's Access Space <<http://access.lowtech.org>>.
  2. Creative Commons <<http://creativecommons.org>>.
  3. Trusted Computing Group <<http://www.trustedcomputinggroup.org>>
- all images ©lowtech.org.

# BARE CODE: NET ART AND THE FREE SOFTWARE MOVEMENT

Josephine Berry Slater

- + In September 1999, the GNU/Linux operating system was awarded a prize by the jury of the art and technology festival Ars Electronica. This award - for the 'net' category - converted a computer operating system, developed through open collaboration, into an artwork. Setting aside the question of the jury's Duchampian gesture of nominating a tool of production as a work of art, the event could be said to signal the popularisation of the analogy, now frequently drawn, between avant-garde art practice and free software production. This analogy insists upon the recognition that the activities of making art and software are both defined by the necessarily collective nature of creative and intellectual production.

On the one hand, the individual genius is recognised as eclipsing the dialogic nature of cultural production behind the emblem of personal style or innovation, which in turn casts the nonartist as creatively defunct. On the other, closed or proprietary models of commercial software production can be said to ring-fence innovation by unfairly claiming individual or corporate authorship of the latest spin-off of a radically collective history of software production in the computer sciences. Copyrighting and closing the source code of a piece of software also artificially narrows its potential future adaptations and condemns it to the stifling monotony of a fixed identity (product), altered only by the strictly controlled modifications that will lead to its release as an upgrade: the illusion of innovation and difference in a regime of unwavering homogeneity.

The rigid controls imposed by intellectual property rights - dependent on the demonstrable origination and hence ownership of ideas - bury the 'code' (artistic or technical) away from the scrutiny of potential collaborators and 'defends' against the fecund chaos of uncontrolled invention. Whereas the coders slaving away at Microsoft are cut off and largely motivated by economic remuneration, the enthusiasts working in the free software community enjoy the benefits of the potlatch or gift economy where 'given enough eyeballs, all bugs are shallow' (Raymond 1999). Likewise, where the artist locked into life on the gallery circuit is condemned to the permutation of a signature style that resembles the assembly-line production of software upgrades, the plagiarist artist, released from the burden of individual identity, surfs the riotous waves of ownerless creation into the unknown.

So the comparison between avant-garde art and free software does more than point out the collective nature of cultural production; it also points to the revolutionary effects this realisation may have when the consumer and the producer become indistinguishable. This same dream of indistinctness also underpins the avant-garde wish to dissolve art into life or, better, to realise art as a practice of life. The division of (artistic) labour - the enemy of such indistinctness - is a crucial starting point for avant-garde engagement when conceptualising a revolution in culture or beyond. To transpose a Marxist analysis of the means and relations of production onto culture: the individual artist has sometimes been compared to the capitalist who harnesses and thus alienates proletarian labour power into surplus value that can, as accumulated product or 'oeuvre', be used to perpetuate the exploitation of the many by the few. The genius-artist, true to the 'winner takes all' model of capitalism, is able to obscure the heteronomy of culture's production behind the singular expression or possession of a sovereign intellect and imagination. A radical realisation of art, then, would be the deposition of the sovereign producer and a return of the shared wealth of creativity to its true owners: the multitude. For this reason, a reappropriation and transformation of the artistic means of production comes to the fore - an opening up of cultural source codes to an undetermined end.

An early articulation of this idea, and one that used the same language of political economy, was the German writer and philosopher Walter Benjamin's 1934 speech to the Institute for the Study of Fascism, titled 'The Author as Producer' (1992). Combating the contemporary consensus among leftist thinkers that the work of art should express the correct political 'tendency' in its content, Benjamin argued that the revolutionary author should move beyond the limited concern with the product to effect the transformation of the 'apparatus of production'. In order for the writer's work to have an 'organising function', he insisted, 'it is also necessary for the writer to have a teacher's attitude. And today this more than ever is an essential demand. A writer who does not teach other writers teaches nobody. The crucial point, therefore, is that a writer's production must have the character of a model: it must be able to instruct other writers in their production and, secondly, it must be able to place an improved apparatus at their disposal. The apparatus will be the better the more consumers it brings in contact with the production process - in short, the more readers or spectators it turns into collaborators.' (1992: 484)

Although to the contemporary reader the notion of culture's didactic function might seem overly doctrinaire, the insight into the cultural product as a tool or apparatus that invites a collaborative appropriation and transformation seems remarkably modern. Where, in the case of writing, the apparatus and the product are indistinguishable - or only distinguishable as discrete functions of the continuous fabric of language - in the case of digital culture and, specifically for our purposes here, net art, the software that is used to produce the artwork is not similarly continuous or transparent. Using proprietary software for the production of an artwork when its source code is closed means either that the model character of the work must be understood as functioning otherwise or not at all. Or, alternatively, this idea can be formulated as the more open question: What is the model character of net art? If, as is largely the case, net artists use proprietary software to produce their work, to what extent can they be said to be transforming the apparatus of production?

## Plagiarism is for Life

Sticking with the generality that most net artists do not, in fact, produce their own software or even rescript existing free software in order to build their projects, it is important to note that net artists do, however, converge with the Benjaminian concept of ‘author as producer’ in some crucial respects. For one thing, the centrality of plagiarism or intellectual property ‘theft’ in this area of art production points not only toward the destruction of the proprietorial role of artist-as-genius and hence a collaborative model of practice, but also to a related principle of recycling, repurposing, or relocating ready-made cultural artifacts or ‘data objects’ in order to release new potentialities and meanings. The transformation of the apparatus of production might therefore be understood as entailing a shift in consciousness that reveals the act of noninvention or relocation as transformative. Suddenly, with this bricoleur’s perspective, the (virtual) world presents itself as one big production landscape, a massive building site heaped with raw materials, a self-replenishing machine of articulation, inflection, and affect. In his piece *Own, Be Owned or Remain Invisible* (1998), for instance, Heath Bunting took an article written about him in the Telegraph newspaper and hyperlinked nearly every word of it to a URL composed of the same word attached to the suffix ‘.com’. Accordingly, the sentence ‘The potential for different possibilities is being diminished by money’ becomes a sequence of URLs: ‘www.the.com; www.potential.com; www.for.com, www.different.com; www.possibilities.com’, etc. The following year, the websites of ‘star’ net artists such as Olia Lialina and Jodi were cloned and subtly altered by the net art collective 0100101110101101.org to reveal the inherent relationship between the information environment and (plagiarist) art. It is the cultural plenitude and potentiality that the plagiaristic ‘model character’ of net art reveals that distinguishes it from postmodern appropriation art as exemplified in the 1980s by artists such as Robert Prince or Sherrie Levine. As Stewart Home explains in his book *Neoism, Plagiarism and Praxis*:

‘Plagiarism enriches human language. It is a collective undertaking far removed from the post-modern “theories” of appropriation. Plagiarism implies a sense of history and leads to progressive social transformation. In contrast, the

“appropriations” of post-modern ideologists are individualistic and alienated. Plagiarism is for life, post-modernism is fixated on death.’ (1995: 51)

Extrapolating from Home, we can surmise that postmodernism’s preoccupation with demonstrating the inertia of the signifying chain in a hyperreal world should not be mistaken for an advancement of the social role of art. Postmodern art moves such as appropriation, while concerned to point out the waning affect of images within a spectacular society, do not amount to a call for the radical transformation of those conditions or an attack on the fetish character of the artwork. This observation is confirmed by the paradoxical fact that artists are able to convert the programmatic neutering of images into a token of artistic insight and originality. In brutal terms, the possibility of creativity per se is shown to have perished in a strategy that aids the survival of the artist. Given the indebtedness of anonymous, plagiarist, and multiple-name-using art collectives such as 0100101110101101.org to the post-Fluxus antics of Mail Art, it is no coincidence to find that mail artist Tony Lowes was able to preempt this Faustian postmodern pact in his manifesto ‘Give Up Art/Save the Starving’:

‘Fictions occupy our minds and art has become a product because we believe ourselves and our world to be impervious to fundamental change. So we escape into art. It is our ability to transform this world, to control our consciousness, that withers on the vine.’ (1991: 77)

The postmodern refusal of originality resides closer to its supposed antithesis - the idea of artistic originality and the cultural calcification that this implies - than net plagiarism with its desire to mutate and transform preexisting, nonoriginal forms and ideas and release creativity from the shackles of ownership.

### **Immaterial Abundance and Artificial Scarcity**

Extending the discussion of the production apparatus and its transformation beyond cultural discourse for a moment, it is essential to mention that the copying and ‘copyability’ of information are both inherent to the functioning of computers. The computer’s operation comprises three core information

activities: the storage, transmission and processing of data, each of which requires that information be copied. Whenever a software program is opened, for example, the version stored on the hard drive must be copied to the random access memory, or whenever a site is browsed on the Web, what we actually view is a copy of the files on the server made by the browser. Furthermore, every copy that is made is indistinguishable from its 'original' and serves equally well as the model with which to make further copies - as a result, the whole notion of the original becomes materially obsolete. The ease of digital reproduction is also such that making a thousand copies is no more demanding than making one. This pushes the marginal costs of production down to practically zero and demands an entire reformulation of surplus value within the information economy. Net artists' focus on plagiarism and nonoriginal production is therefore not only intrinsically a part of the processual logic of the net, but relates also to a drastic transformation of the production landscape in general as it learns to substitute an economics based on immaterial abundance for one based on material scarcity.

As the highest stakeholders in the economy manoeuvre to artificially impose scarcity onto the natural abundance of digital information and its innate replicability, the struggle for information's 'freedom' has begun in earnest. In this struggle, the free software movement has played a core role in popularising the ethic of nonproprietary software in a climate of rabid intellectual property registration. The free software movement was initiated by the Free Software Foundation (FSF), whose founder, Richard Stallman, saw the damage being inflicted on the programming community in the early 1980s by the privatisation of software. He recalls working at MIT's Artificial Intelligence Lab in the 1970s, when sharing software was considered a fundamental part of the process:

'We didn't call our software "free software" because that term did not yet exist; but that's what it was. Whenever people from another university or a company wanted to port and use a program, we gladly let them. If you saw someone using an unfamiliar and interesting program, you could always ask to see the source code, so that you could read it, change it, or cannibalise parts of it to make a new



program.’ (Stallman 1999)

By the 1980s, however, all this was beginning to change. As commercial companies were set up to produce software, the ‘hackers’ at MIT were gradually poached away and their collective expertise converted into privately owned chunks of code. Programmers started to see this as an ‘acceptable paradigm’, not realising that the programming community and culture - not to mention the standard and innovation rate of code - were falling into decline. For Stallman, the issue is not so much that Microsoft has subsequently become the biggest owner of proprietary software and therefore the greatest ‘subjugator’ of users to its laws; it is the paradigm per se that worries him. ‘I don’t want to have a master. I’m not willing to accept the chains, no matter who is holding them’, he has insisted.

To combat the rise of the master-slave relation in computing, the FSF started work on the entirely free GNU/Linux operating system, which spawned many other free software initiatives and products. The FSF’s other radical innovation was the General Public License, which enshrines the principle of ‘copyleft’ - the right to freely use, modify, and distribute software - ironically enough, by using copyright law. A classic act of detournement. It is on this latter issue of copyleft that the free software movement differs significantly from the ‘open source’ movement with which it is often confused. The term open source, coined by Eric S. Raymond in 1998, defines only a piece of software whose source code has been left open. It does not, however, stipulate that this source code can thereafter be copied, adapted, and distributed by anyone at all. In many cases, open source describes a proprietary software, such as Netscape Navigator, whose source code can be viewed but not reused, modified, or distributed. For this reason, when in the wrong hands, what open source achieves is the deployment of the ‘enough eyeballs’ principle for private ends. In the worst cases, it means that the user community is solicited to scrutinise the existing source code, detect bugs or improvements, and then advise the software company on how best to perfect its software. Here we have an example of the commonplace commercial tendency to

disingenuously invoke community (the good old days at MIT and the fraternity of coding) in order then to convert free labour, or what Antonio Negri and Michael Hardt have recently called ‘affective labour’, into private gain.

### **Bios and Backlash**

Avant-garde net art does not limit itself to a critique of the artwork’s autonomy, but extends its critical activity beyond art-internal discourses to address precisely this condition that Negri and Hardt, after Michel Foucault, call ‘biopolitical production’ in their recent book *Empire* (2000). This could be summarised as the general subsumption of the social bios - entailing the free contagion of ideas, the compulsive flow of communication, the affectiveness of bodies, the inventiveness of communities - by capital. Negri and Hardt pick up and extend Foucault’s observation that ‘life has become... an object of power’, by which is meant that there is now a power struggle over the production and reproduction of life itself. Biopolitical production is understood as the mode of production and power that accompanies a historical shift from the ‘disciplinary society’ to the ‘society of control’. Where the disciplinary society controlled and fixed bodies within institutions such as factories, schools, hospitals, or asylums and used ‘closed, geometrical, and quantitative logics’, the society of control is ‘open, qualitative, and affective’. The disciplinary society can be described as working to contain subjects, while the society of control centres on the production of subjectivities. In other words, where once there was an outside to the factory, an edge to the spaces of discipline, now, in the information age, the behaviour of the individual is continuously tracked and aggregated (or at least potentially) so that our entire existence becomes entwined with production. One has only to think of advertising slogans such as British Telecom’s ‘It’s good to talk’ or its ‘helping people make connections’ to get a sense of this. The phone company no longer represents itself as the mere provider of a communications infrastructure, but as a potent social agent conjuring community out of the alienation of modern life. ‘Talking’ is no longer something we do, and always have done, but something that British Telecom helps us to do, even reminds us we should do!

The net artist Rachel Baker's 1997 project *TM Clubcard* is a riposte to corporations' biopolitical masquerade as community builders - in this case the UK supermarket Tesco's attempted disguise of a consumer profiling system behind the form of a social 'club', for which the 'Clubcard' acted as both membership card and tagging device. In an article written by Baker on this project, she singles out this insidious aspect of the scheme, which her own 'disloyalty cards' address:

'..the Clubcard encourages the idea that customers are joining a "club". However, the members of this club exist in separate datafields and remain, to all intents and purposes, alienated from each other. The "club" only defines a relationship between the individual Clubcard holder and Tesco superstore, with little contact encouraged between other members. Some club!' (1997)

For this project, Baker applied the 'earn points as you shop' system to surfing. Encouraging a number of 'partisan' websites to display the pirated Tesco Clubcard logo, Baker then assigned an immediate personal identification number, derived from real Clubcards 'acquired' from Tesco stores, to anyone who clicked on the logo and filled out a questionnaire. These cards were later mailed to the subscriber. Every time subscribers visited one of the sites in the TM Clubcard catalogue, they were then rewarded with loyalty points, but the points no longer related to a money-off reward. Instead, using the database of email addresses collected through the questionnaire, Baker would send 'erroneous junk mail' to the card holders. This included communications addressed to other people or a printout of the database's own faulty program. Baker explains:

'This strategy ensures that recipients know that they are on a database, that it is dysfunctional, and, more importantly, that there are other members of the club with whom potential contact is possible.'

Out of 'the machinery of a monstrous incorporated presence' Baker seeks to build a truly sociable club (1997).

Tesco quickly spotted the project, however, and tracked down its author via a search made with the InterNIC domain name registrar, which provided Tesco with the address of Irational Gallery Limited (the organisation name used by

Rachel Baker and fellow net artist Heath Bunting to register the Irational.org domain). On April 21, 1997, Irational.org received a letter from Tesco's solicitors Willoughby & Partners accusing them of copyright and trademark infringement as well as the more serious crime of passing off, which referred to Baker's use of the Tesco brand identity to extract personal data from web users. As a result of Tesco's threat of civil action, rather than simply taking down the site as the Tesco lawyers had demanded or transferring the site to another domain hosted by a foreign server, Baker decided to switch the branding to that of the Sainsbury's supermarket chain. This was largely due to the fact that the site was dependent on the various catalogue sites and was consequently not a discrete, easily transferable data object. At this point Baker foresaw what the project would indeed become: 'The project's trajectory could be a series of solicitors letters each telling a story of a different loyalty card hijack and trademark transference' (1997). Today, the site no longer functions as originally intended but is instead a collection of disassembled components serving as a record of the project, its participants, some of the data collected, and the legal correspondence generated by it.

This project is interesting because it attacks the corporate production of a controlled community using its own tools. Hacking the supermarkets' own branding and data-collection system, the project attempts to fabricate a true community of interest off the back of the dysfunctional 'loyalty club'. This relates back to the free software movement in the sense that the artistic 'coder' modifies the source code of a piece of corporate 'software' to a different end. Rather than building the artwork from scratch, Baker plagiarises the work already done by supermarket chains to liberate a new potential hidden within it. TM Clubcard also participates in the spirit of free software in the sense that it combats the extension of proprietary rights over what was formerly freely available in the public domain or outside the scope of corporate interest: in this case, the contingent decisions of shoppers or common phrases (such as 'Baker's finest', which she lifted from the store's bakery section) that Tesco has protected as part of its brand identity. Of course, where this differs markedly from the free

software movement is the illegality of Baker's activity. Where the free software movement can rewrite software from scratch rather than ripping off preexisting pieces of code and thus coexist with the commercial software industry, the force of Baker's work depends on the creative hacking of social, technical, and corporate systems. This reveals that the question of original invention is one of the limits to the analogy between the free software movement and net art. Where it is possible to write code entirely from scratch (albeit collectively and notwithstanding the possibility of its infinite reuse thereafter), the whole ethos surrounding plagiaristic net art prohibits any return to a notional ground zero. It is not possible to totally rescript the 'society of control', and the dialectic between art and life is such that it cannot merely coexist alongside the status quo as an alternative system.

Having characterised the free software movement as capable of producing a discrete stratum of software that can coexist with proprietary software, it must, however, be stressed that this harmonious relation pertains only to the legal status of the code. In other words, free software may not infringe copyright laws by plagiarising proprietary code, but it certainly poses a threat to big business by promising to incite a mass consumer flight away from commercially created products to nonproprietary ones. An insight into the potential scale of this flight was given when, in 1998, the Mexican government announced its decision to install the GNU/Linux operating system in 140,000 elementary and middle-school computer labs nationwide. The decision (subsequently rejected on the grounds that people did not possess the necessary user skills), was made primarily on economic grounds, since Mexico simply could not afford to pay for all the licenses on proprietary software. Extrapolating from the example of Mexico to the rest of the developing world, it seems reasonable to speculate that this huge emerging market might truly be persuaded by the economic and cultural wisdom of using free software. Speculating yet further, but not beyond the bounds of reason, it is possible to see how the free software community of coders will spread far outside the western world to include the emerging coders of the developing world. The open protocols (http) upon which the World Wide

Web itself operates, and which the numerous commercial and proprietary operations that depend on it take for granted, might yet be instrumental in helping to connect up the software industry's nemesis: a world wide web of free software users and producers. Here it is hard not to be struck by the fit between Benjamin's idea of the revolutionary potential of the self-transforming production apparatus and the history of networked computing. It is also this potentiality inherent in the communicative nature of biopolitical production or biopower that Negri and Hardt identify in their book *Empire* and that forms the grounds for their unflagging optimism: 'The immediately social dimension of the exploitation of living immaterial labour', they argue, 'immerses labour in all the relational elements that define the social but also at the same time activates the critical elements that develop the potential of insubordination and revolt through the entire set of labouring practices.' (2000: 29)

### **Bare Code**

I/O/D's *Web Stalker* (1998) is one of several 'art browsers' that reconfigure standard interfaces to reveal this selfsame 'potential for insubordination'. The *Web Stalker*'s premise is to break with the 'technical-aesthetic monopoly' of Netscape Navigator and Microsoft Explorer browser software to reveal, on one level, that there is nothing in the HTML code being streamed to a computer that forces an adherence to its design instructions (Fuller 1999: 37). As group theorist Matthew Fuller has put it: 'These instructions are only followed by a device obedient to them'. I/O/D conceives of the HTML stream as a current that could be interpreted by a different kind of software in a way that has nothing to do with its purpose. In practical terms, the *Web Stalker* has six main functions: the Crawler, which actually links to the Web, looks for links inside a URL and logs them; the Map, which takes the HTML stream from the Crawler and represents all HTML documents as circles and all links between them as lines (this map is dynamically linked to the Crawler's constant production of new data which can, in turn, be mapped); the Dismantle function, which gives more detailed information than the Map function; the Stash function, which is a way of saving the user's web use; the Stream function, which demonstrates how the HTML

'feed' from all the sites being explored is mixed together as a single stream; and finally, the Extract function, which strips a document of its text and then displays the text in its own window. When the *Web Stalker* is opened, it turns the entire screen black, and the users then take the cursor and draw a window, repeating this action for every extra function they want to employ. Although the background colour can be altered, its default setting is black, something that Fuller describes as announcing 'a reverse nihilist moment', by which he means that where browsers conventionally screen the network activity out, 'suddenly everything is there'.

Although I/O/D built the *Web Stalker* using the commercial software Macromedia, its effect - of baring the HTML stream and creating an encounter between the user and the normally hidden activity of the net - relates directly to the spirit of free software. The user's normally amnesiac passage through the net is suddenly rendered mappable as past links are displayed, and a galaxy of potential links made evident. Likewise, the blinkering produced by the universal adoption of GUI metaphors is thrown off, and the user is able to gain the sense of the multiple possibilities of which the computer-mediated communications (CMC) environment is actually capable. This realisation could be an important step toward the Benjaminian ideal of consumers becoming collaborators through the model character of the work. In this respect, an artistic interpretation of the principles of free software entails the exposure of what is ordinarily screened out, the introduction of the raw into the cooked. This, in turn, relates to earlier avant-garde inclusion of previously 'obscene' or unacceptable material whose introduction into the artwork, if only temporarily, sent shockwaves through culture and society as the coordinates of possibility were traumatically redrawn. The cubists' inclusion of real-world materials into the space of the painting, the surrealists' inclusion of the unconscious and its automatic drives into the production and subject of the artwork, and the minimalists' discovery of the actual space of the gallery are just some of the examples that spring to mind. This 'obscene' or excluded material contains within it a double potential. On the one hand, it is the 'bare life' that the biopolitical mode of production fixes upon

and subsumes within itself as the new object of power. On the other hand, it contains within it the potential to explode the workings of power - be this cultural, technological, or political - through a kind of macrosocial act of desublimation that makes it impossible for the repressive social fictions to be sustained.

In the case of 0100101110101101.org's recent work *life\_sharing*, the construct of privacy and individual identity is deployed as the point of rupture. Taking its cue from a technique called 'file sharing' - by which computers, usually connected via an ethernet or intranet, can share the files stored on other computer hard drives - 0100101110101101.org opened its computer's entire hard drive up to the net. Although it is necessary to access this computer via the membrane of the browser, the viewer can nonetheless access all the files stored on the artists' hard drive simply by visiting their home page. In a certain sense, this project simply draws attention to how the Internet already functions: When visiting a website, one is in any case downloading a file stored on a server computer's hard drive, which is constantly connected, via a phone line, to the net. *Life\_sharing* essentially operates on the same principle except, rather than making only certain files available as HTML documents, all the files are accessible, including its software and the GNU/Linux OS. In a more overtly political sense, the project identifies the attempt to ring-fence and protect information (on the hard drive or the server computer) as both a futile exercise and a fearful capitulation to the myth of individual identity: 'Consider the increasing tendency toward intrusion in the private sphere', the artists proclaim. '0100101110101101.org believes firmly that privacy is a barrier to demolish. *life\_sharing* must be considered a proof ad absurdo. The idea of privacy itself is obsolete'. In several ways, then, excess and abjection are summoned up to combat the entrapment of the individual within the individuating microphysics of power. A total data surplus is suggested as a means to combat the paranoia of surveillance systems operated by the state and private enterprise, and the controlling boundaries of the viewable website are ruptured to lay bare the potential for the entire hard drive - and by extension the private sphere - to become viewable from the outside.



To end by returning to where we began, the decision to award the GNU/Linux operating system with the Prix Ars Electronica signals the entry of the free software ethos into the popular imagination, but it should be remembered that this includes the corporate imagination as well. As we have also seen above, biopolitical production is a two-way street and the flow of traffic moves back and forth between strategies of power and counterpower. It might then come as no surprise to discover that, shortly after this ‘radical’ decision, four members of the Ars Electronica jury (Derrick de Kerckhove, Lisa Goldman, Joichi Ito, and Marleen Stikker) apparently published a joint statement announcing that the decision had been rigged, or at the very least steered, by some of the big commercial sponsors of the festival: Siemens, Microsoft, Oracle, and Hewlett-Packard:

‘From reliable sources’, they announced, ‘we also learned that the decision was made weeks before the “.net” jury decision on linux. [We are going public because] we have also just learned that the above-mentioned IT-companies are involved in a linux distribution joint venture and a strategic alliance. Their joint venture startup will most probably become one of the leading linux distributors, directly attacking Red Hat and SUSE. This is the classic oligopolistic strategy. They cannot buy linux, nevertheless, they will take control over the distribution of the competitor.’ (1999)

Although this post later turned out to be a fake, the substance of the mail points to the truth of the judges’ decision, or the commercial logic that it reveals: the realisation, touched on above, that what is given freely by communities is seen ever more as the ideal object of power and commodification. Here, however, is where the tactical mode adopted by net artists and other independent media operators starts to show its strengths. Where the logic of capital, despite the shift to biopolitical production, must always seek to derive profit from its investments by extracting a product, the tactician eschews the proper (proper names, fixed identities, defined territories) in the name of the makeshift, precarious, ephemeral, and improvisatory. The free software movement - which is based on the idea of the complete open-endedness of software’s code and the belief

that the chance innovations of open collaboration outstrip the battened-down defensiveness of private R&D - should, in this respect, be considered tactical. The tilt of production toward the biopolitical - subsuming the communicative and affective relations of society - seeks to harness the innovations of everyday tactical activity but, through converting what is in flux into something fixed, continually misses the true possibilities of tactical invention. Net artists, in the best instances, can articulate both the new modes of production defined by CMC and their potential radicalisation. By baring the code - be it social, technological, or aesthetic - that underpins the Internet environment, net artists provide an insight into the potential for anyone to become a producer or to extend the free software ethos to cultural and social production in general. Cooptation always looms, but, as we have seen from the fictitious comments of the four dissenting Ars Electronica judges, this usually hinges on converting the 'obscurity' of what is freely produced or given into the 'properness' of what can be packaged and distributed. Hence, baring the code or revealing the unseemly openness of technical and social operating systems augurs an alternative kind of biopolitical production - one that defies any easy recuperation and sale and that contests the production of subjectivity by means of an open cultural practice.



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**REFERENCES:**

Rachel Baker (1997) 'TM Clubcard. Remember: Language Is Not Free', Telepolis, 22 July <<http://www.heise.de/tp/english/special/ku/6168/1.html>>.

Walter Benjamin (1992 [1934]), 'The Author as Producer', in Charles Harrison & Paul Wood (eds.) *Art in Theory 1900-1990: An Anthology of Changing Ideas*, Oxford: Blackwell.

Matthew Fuller (1999) 'A Means of Mutation: Notes on I/O/D 4 The Web Stalker', in Josephine Bosma et al (eds.) *Readme! Ascii Culture and the Revenge of Knowledge - Filtered by Nettime*, Brooklyn: Autonomedia.

Michael Hardt & Antonio Negri (2000) *Empire*, Cambridge Mass.: Harvard University Press.

Stewart Home (1995) 'Plagiarism', in *Neoism, Plagiarism and Praxis*, Edinburgh: AK Press.

Tony Lowes (1991) 'Give up Art/Save the Starving', in Stewart Home (ed.) *The Assault on Culture: Utopian Currents from Lettrisme to Class War*, Stirling: AK Press.

Derrick de Kerckhove, Lisa Goldman, Joichi Ito, Marleen Stikker (1999) 'Linux wins Prix Ars due to Microsoft Intervention', Nettime, 5 September <<http://www.nettime.org/>>.

Eric S. Raymond (1999) *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary*, Sebastopol, CA: O'Reilly <[http://www.firstmonday.dk/issues/issue3\\_3/raymond/](http://www.firstmonday.dk/issues/issue3_3/raymond/)>.

Richard M. Stallman (1999) 'Free Software Is a Political Action', in conversation with J.J. King, Telepolis, 18 August <<http://www.heise.de/tp/english/special/wos/6469/1.html>>.

# LONDON.PL

Harwood

```
+ # Perl Routines to Manipulate London w.blake@scotoma.org
# London.pl, v 0.0.0 1792/02/23 08:16:43
# UNFINISHED
# Copyright (c) 1792-2002 William Blake
# Unpublished work reconstituted W.Blake@Scotoma.org.
# Permission granted to use and modify and append this library
# so long as the copyright above is maintained, modifications
# are documented, and credit is given for any use of the library.

# Thanks are due to many people for reporting bugs and suggestions
# For more information, see http://www.scotoma.org

# Grave the sentence deep. My love of London held in torment.
# Heavy, rains of cruelty, disguised in spectacular investments.
# Accumulate interest in Jealousy,Terror and Secrecy.
# The bloated Square mile
# gifts this isle.

# In this citys dark gates - the tree of knowledge leads
# to this mansion built on misery.
# Here the dress code of secrecy cloaks the flesh in fear.
# This is how the proprietary city gets built,
```

# Hidden in every proprietary street,  
# In every proprietary house,  
# In every proprietary possession we meet.

# NAME

# London - Simple Act Redress  
# The American War was the last judgment on England.  
# Inoculated against the sewer. Albion's Angels  
# Rise up on wings of iron & steel, spreadsheet & rule:  
# To gift sanitation & sulphurous fire to:  
# The wheat of Europe,  
# The rice of Asia,  
# The potato of America,  
# The maize of Africa.  
# Massacre-bloated, angels crawl from the corpse of war.  
# Five times fatter than when they entered.

# Choking lays the sickening Leveller-republican. Caustic fumes -  
# dusts, gust from wars - grinding wheels - mills of cruelty -  
# mills of terror, jealousy & secrecy. Every light ray turned  
# to shadow and despair. to rikets - scabies - ticks & lice.  
# Until the dark sun never set on the Hanoverian empire.  
#  
# Rise then the Leveller-republic, rise on wings of knowledge  
# flowing in the domain of the many.  
# For heaven is more knowledge then one man can muster in a lifetime.  
# For hell is more knowledge then one man can muster in a lifetime.

# SYNOPSIS and DESCRIPTION

# This Library is for redressing the gross loss to Londons  
# Imagination of children beaten enslaved fucked and  
# exploited to death from 1792 to the present.

```

# We see this loss in every face marked with weakness or marked
# with woe.

use PublicAddressSystem qw(Hampstead Westminster Lambeth Chertsey);
# PublicAddressSystem is an I/O library for the manipulation of
# the Wheelen Vortex4 129db outside warning system.
#
# from Hampstead in the North, to Peckham in the South,
# from Bow in the East to Chertsey in the West.

# Find and calculate the gross lung-capacity of the children
# screaming from 1792 to the present
# calculate the air displacement needed to represent the public
# scream
# set PublicAddressSystem instance and transmit the output.
# to do this we approximate that there are 7452520 or so faces
# that live in the charter'd streets of London.
# Found near where the charter'd Thames does flow.
#
# DATATYPES USED:

local @SocialClass = qw( RentBoy YoungGirl-Syphalitic-Innoculator
                        CrackKid WarBeatenKid
                        ForcedFeatalAbortion Chimney-Sweeps
                        UnCategorisedVictim);

# These are a series of anonymous hashes;
# At least one is required at compile time:
#

```

```

local %DeadChildIndex;

# The Data for the DeadChildIndex should be structured
# as follows:
#
# %{DeadChildIndex} => {
#   IndexValue => {
#     Name      => " Child name  If known else undefined ";
#     Age       => " Must be under 14 or the code will
#                   throw an exception due to $COMPLICITY";
#     Height    => "Height of the child"
#     SocialClass => "RentBoy YoungGirl-Syphalitic-Innoculator
#                   CrackKid WarBeatenKid ForcedFeatalAbortion
#                   Chimney-Sweeps UncategorisedVictim "
#   }, As many as found
# }
#

# CryOfEveryMan
# First we add the Class attribute to the DeadChild
# instance under review
# Next add the VitalLungCapacity of that childs ability
# to scream

sub CryOfEveryMan {

  my $index = shift;

  # Because a child may belong to one or more SocialClass
  # traverse the list adding the prospects of that SocialClass

```

```

foreach my $Class (@SocialClasses){

    # Add the contents of this $Class to
    # $DeadChildIndex->{$Index}
    # Class attribute

    if( $Class eq $DeadChildIndex->{$Index}->{Class}){

        $DeadChildIndex->{$Index}->{Class} = %{$Class} ;

    }else{

        warn "$DeadChildIndex->{$Index}->{Name} is not a ".
            "member of = $Class\n";

    }
}

$DeadChildIndex->{$Index}->{Class} = %{$UncategorisedVictim}
if ! $DeadChildIndex->{$Index}->{Class};

# The average daily scream output of fear for the period
# 1792-2002 is 6.
my $TotalDaysLived =
($DeadChildIndex->{$Index}->{Class}->{LifeExpectancy} * 365)

# Calculate the gross $Lung Capacity For Screaming for
# this child
my $LungCapacityForScreaming =
    &Get_VitalLungCapacity(\%{$DeadChildIndex->{$Index}}) *
    $TotalDaysLived;

```



```

# assign to $DeadChildIndex->{$Index}->{ScreamInFear}
$DeadChildIndex->{$Index}->{ScreamInFear} =
$LungCapacityForScreaming;

}

# need a function to play the sound file for
# length of time * volume of speaker system * air displacement
# The Get_VitalLungCapacity routine uses the Age and Height
# entry of the DeadChildIndex to calculate the Lung-Capacity of
# the dead child. This is then used to calculate the volume and
# capacity of screams when terrified.

sub Get_VitalLungCapacity{

    my $DeadChild = shift;
    my (
        $VitalLungCapcity, # vital lung capacity in liters of air
        $Height,           # is height in centimeters
        $Age,              # is age in years
    );

    $Height = $DeadChild->{Height}
    unless ! defined $DeadChild->{Height};
    $Age     = $DeadChild->{Age}
    unless ! defined $DeadChild->{Age};

    if ($Height && $Age){

        # lung capacity increases with height, but decreases
        # with age.
        # So a person screams the most when they are as tall

```

```

# as they're going to be.
# (Probably about 18 or 20 years old.)
# This falls outside of our basic parameter of
# 0 to 14 years.
# But the calculation is still useful

$VitalLungCapacity = ((0.041 * $Height) -
  (0.018 * $Age)) - 2.69 ;

return $VitalLungCapacity;

}else{

# we may not know the height, try to guess from SocialClass
if(! $Height){
  $Height =
    Get_HeightFromClass(Height => $DeadChild->{SocialClass})
}

# we may not know the Age, try to guess from SocialClass
if(! $Age){
  $Age =
    Get_AgeFromClass(Age => $DeadChild->{SocialClass})
}

if($Age && $Height){
  $VitalLungCapacity = ((0.041 * $Height) -
    (0.018 * $Age)) - 2.69 ;
  return $VitalLungCapacity;
}else{

```

```

# Approximate it
# The average 6 year old child is about 120 cm tall.
# So $Height =130.0 and $Age = 6.0
# Put this into our equation and we get that the
# VitalLungCapacity is about 2.1 litres.
# The average 14 year old teenager is about 160 cm tall.
# So Height=160 and Age=14.
# This gives us a vital lung capacity of about 3.6 litres.

if($Age){
    $VitalLungCapacity = ((3.6) - (2.1) / 8.0) * $Age;
    return $VitalLungCapcity;
}else{
    $VitalLungCapacity = ((3.6) - (2.1) / 8.0) *
        int(rand(14)) ;
    return $VitalLungCapcity;
}
}
}
}

```



# FREAKS OF NUMBER

Matthew Fuller

- + There is a very intriguing book from 1893, with a second edition in 1905. Written by Maurice d'Ocagne, a Professor at the l'Ecole des Ponts et Chaussées, *Le Calcul Simplifié par les Procédés Mécaniques et Graphiques* is subtitled 'a history and description of instruments and machines of calculation, tables, abacuses and nomograms'.<sup>1</sup> Much of the book is exactly that: a set of descriptions for increasing the speed and accuracy of numerical calculation. The book opens with a standard piece of puffery, noting the substantial importance to all branches of modern science and industry of the art of calculation.

The text is notable for a number of things. First, it is perhaps one of the first examples of software criticism. D'Ocagne makes developed comparative portraits of each of the kinds of calculating machines and techniques available in 1905 (indeed the book is bang up to date, with several last minute addenda on new machines). All the heroes of computation and their amazing gadgets are there: Pascal, Babbage, Leibniz, Napier. But there also appears a set of more everyday pieces of equipment, cash registers, arithmometres, and so on.

Alongside the super-accurate ironmongery, one of the techniques promoted by the book is that of Nomography. This lost art is essentially that of producing gridded visual diagrams showing the results of what would otherwise be mental calculations. In a reverse of today's expenditure on processor power, these are graphics for the purpose of calculation, computer graphics. In his *Universal*

*History of Numbers*, Georges Iffrah describes d'Ocagne's work:

'The first major step towards modern concepts was taken in 1893 when Maurice d'Ocagne discovered the famous collection of calculating machines in the Conservatoire des Arts et Métiers as well as the equally important collection belonging to General Sebert (now owned by IBM). Since he could not relate these machines to any contemporary mechanical theory, d'Ocagne had the highly original idea of placing them into categories for which he developed his own hierarchy. To achieve this, he borrowed his classification criteria from biology. From 1905, the date the new edition of his *Calcul Simplifié* appeared, he always referred to "the comparative anatomy of calculating machines". This stripped mechanical calculators of the uniqueness they had previously enjoyed and which conferred on each its peculiar bizarreness or curiosity. Without question, d'Ocagne's approach paved the way for an axiomatic theory of mechanical calculating machines. After that, the study of machines was viewed as a discipline that could be rational, objective and therefore scientific.' (2000: 228)

Actually, the book is not quite as rigidly scientific as Iffrah has it. D'Ocagne acknowledges in the introduction that a number of things appear in more than one category for the purposes of comparison. The book is more aimed at increasing the understanding and availability of techniques of calculation.

Another thing that is fascinating about this work is that it begins, after the general assurance that arithmetic is important to a number of trades and professions, with a list of what can only be called freaks of number. D'Ocagne makes an inventory of individuals for whom the power of calculation reaches a prodigious intensity:

'The history of calculation has conserved the names of several of them. We can cite: the young Lorrain Mathieu Le Coq who, in Florence at eight years old, filled Balthasar de Monconys, in his third voyage to Italy (1664) with wonder; Mme de Ligné, who, in the salons of the Restoration, made, according to Mme de Genlis, the most complicated mental operations in an atmosphere full of the noise of conversations; the negro slave Tom Fuller, of the state of Virginia, who, at the

end of the 18th Century, died at the age of twenty-four without being able to read or write; the Wurtemburgeois shepherd Dinner; the Tyrolian shepherd Pierre Annich; the Englishman Jedediah Buxton, a simple thresher from a barn; the American Zerah Colburn who was successively an actor, Methodist deacon and teacher of languages; Dase who applied his faculties of calculation, the only ones that he had, to the table of prime divisions of Burkhardt for the numbers 7 000 000 to 10 000 000; Bidder, the constructor of the Victoria Docks in London, who became president of the Institute of Civil Engineers and who transmitted in part his gifts for calculation to his son Georges; the Sicilian shepherd Vito Mangiamelle, who possessed, besides, a great facility for learning languages; the young Piemontais Pughiesi; the Russians Petrof and Mikhail Cerebriakhof; the shepherd of Touraine Henri Mondeux, who came into great reknown during the reign of Louis-Philippe; the young Bordelais Prologeau; the human-trunk Grandemange placed in the world without arms or legs; Vinckler, who was the object of a remarkable experience at the University of Oxford. Finally we have today the marvelous arithmetical tours de force of the Piemotais Jacques Inaudi, who was also a shepherd at the beginning and who has found an emulator in the person of the Greek Diamandi.’ (1905: 3-4)<sup>2</sup>

D’Ocagne ascribes much of the facility of calculation found so often in this list amongst shepherds because of the way in which, even in childhood, calculation can provide a way of passing the time whilst guarding the flock. To him, such powers of calculation are extremely rare, and often won at the expense of other faculties.

The fascination with numerical prodigies continues today, although it is often more radically clinicalised as, for instance, romantically described in the film *Rain Man* (1988). Indeed in a number of recent films the quadrivium or four arts of mathematics of ancient Greece (arithmetic, music, geometry, astronomy) have appeared as existing on the border of neurological disorder. What is interesting though is that this list of numerical freaks appears at the beginning of a sober text on the means of automating mathematical operations. It is as if it were

something that has to be acknowledged, marveled at, but disowned. The chemist describes the alchemists. This shudder of recognition and of admiration passes. The thing is safely out of their clammy hands, but the continuum between these persons and these machines is established.

There is however something in this freakishness that is amplified by calculation machines. It is something that provides a figure of the monstrous, the numerical grotesque. Whilst the shepherds, the slaves, the human trunks are marginalised, in the case of the former literally at the edges of habitability up the hills grubbing for grass, they are also, once their talent or curse is recognised, wrenched into the centre of attention as a talismanic weird cousin.

For the comparative anatomy of calculation devices, these are freaks, because they have this power lodged into their heads. Such power should be built only as the result of an anatomy that makes itself comparable by means of abstraction by a machine. That such a continuum exists is the result of a key quality of mathematics as a media - that it is immensely abstract, but at the same time, utterly concrete.

I make this detour into the nineteenth century because this period provides a veritable thunderstorm of cloudburst upon cloudburst of arithmetico-material drives. We have Charles Darwin, who spoke of the 'geometrical powers of increase' inherent in reproduction and variation of species: 'There is no exception to the rule that every organic being naturally increases at so high a rate, that if not destroyed, the earth would soon be covered by the progeny of a single pair.' (1985: 117) It is also the century of Karl Marx, who mapped the chaotic, ruinous and massively fecund explosion of the factory system and of capitalism. In his book *The Taming of Chance* (1990), Ian Hacking uses the term, 'the avalanche of numbers' to describe the birth of statistics and the attempt to map and control populations in terms of health, criminality, births, deaths, marriages, and physical non-human phenomena occurring at the same time.



On the scale of numbers, post-industrial society is perhaps something that occurs when the ‘avalanche of numbers’ of Hacking, an enormous and self-generating torrent of factualisation, tabulation and recording meshes with numericalised labour, mechanisation and product and informational standardisation and variation.

Arithmetico-material drives occur as a result of the application of the very fruitful perspectival trick that Newtonian (1642-1727) science pulls. This form of science, ‘Consisted in isolating some central, specific act, and then using it as the basis for all further deductions concerning a given set of phenomena.’ (1985) In its strongest form it was led by champions such as Pierre Laplace (1749-1837), whose determinism was such that he made the well-known claim that if the position of every particle could be but known, ‘Nothing would be uncertain, and the future, as the past, could be present to our eyes’. But one can be determinist and be rather more modest.

Numericalisation is the process of turning a live thing, a dynamic, or an object into something that exists as a numerical representation of its properties, or that has such an abstraction of itself embedded within it. Arithmetico-material drives are those forces produced in the coupling of numericalisation or abstraction with the capacities and propensities of matter. Arithmetico-material drives are firstly generated in the moment when matter is formed, according to the mathematical model of it given by such science. One result of such objectivisation is the ‘Standard Object’, the modular component typical of globalised trade, but with its roots deep, for instance, in the licenses afforded the monopolistic guilds of the Middle Ages, and the history of trading generally. Everything from ships to pizzas are quality assured, subject to rigorous treaties and processes of standardisation. These are typical results of industrial production. The second stage is when this process of standardisation becomes so abstracted it becomes amenable to massive acceleration in production. The human work put into the production is scanned, abstracted and multiplied by means of machinic energy. Once turned into numbers, registered as a pattern, the actor of the work can be discarded

and the pattern accelerated. When hooked up to processes of production we get the discovery that, according to Walter Benjamin, ‘...the speed of traffic and the ability of machines to duplicate words and writing outstrips human needs. The energies that technology develops beyond this threshold are destructive. First of all, they advance the technology of war and its propagandistic preparation’ (2002: 266-7). Overproduction, the massive churning of ordered matter and of markets: one might also say that any development beyond this threshold might be captured by forces other than war, for redistribution, for the reshaping of work, for burning. One of the aims of art is to capture this excess away from the apparatus of war.

Opposed to the Platonism of mainstream computing which finds its beauty in the most apparently simple, the most purely expressed of formal resolutions to a problem, the recognition of arithmetico-material drives reaches its current apotheosis in software. The logically mighty Turing machine might be trapped in the weakling body of a PC, but it provides an environment which is computationally almost unimaginable to its users. Every household and every workplace with a computer contains its own avalanche of numbers. That many are now networked allows arithmetico-material patterns of turbulence or gentle weather to move from hard drive to hard drive, in modes including the various forms of voluntary or involuntary file-sharing, such as peer-to-peer networks or viruses.

We can see too that much digital art is often the turning loose of these powers into the contexts of established art genres. Thus the most typical ‘digital’ reversioning of a portrait is the morph, the simultaneous assault on and reconfirmation of identity by the availability of processor cycles and of algorithms to compute various kinds of medium terms, variables in between states; to find edges; to match patterns of light intensity.<sup>3</sup> What does it mean to throw the core digital archetypes: loops, variables, arrays, conditionals, and so on into the context of art? By the sheer onrush of available permutations the historically established art genres are shredded, but at the same time they become the loci around which

activities are fixated. I mean this in the sense of the most willfully tedious work, typical of, say, the grimmer corners of Siggraph, but also about work which aims to deploy this reconstituting turbulence in ways that use generic limits to test out and mutate calculational monstrosity itself.

Equally it is not just self-consciously computational art which allows ways of sensing into these processes. In his paintings, Keith Tyson shows these spaces in the various ways in which they are constructed, as jargons, as diagrams, as routines, as the art gestural jargon of splashes and drips, as recordings of certain kinds of material bodily dynamism. I like the way he uses theorems and equations as part of pop culture, as cosmic doodles. At once schematic and sploshy, they are enormously vivid and multidimensional.

Further into the numerical grotesque, and thus beyond the boundaries of contemporary art good taste, M.C. Escher created landscapes of ink on paper, possible yet impossible according to the 'laws' of perspective, these laws which exist only as a loophole hackable by excessive feats of draughtsmanship. Equally as deft an exponent of the geek sublime, but in text, J.G. Ballard's story *Report on an Unidentified Space Station* (1990) is of an endless space station being explored by a crew who will never reach its end. Both of these are made possible by the simplest linking devices of realist representation, a linear narrative with a narrator or a line dividing one space from another. Telephone call-centres too, created by means of digital exchanges, a structured progress through an ordered sequence in which potentially thousands of people are held in suspension waiting their turn in the multi-choice queue. Digital abundance creates buffer zones as well as turbulence, pockets of delay, holding patterns.

Here, I think it is useful to recall one of the early critics of this easy facility of achievement in computing. Joseph Weizenbaum is noted as a computer scientist and famed for the Eliza program, the core conceptual work behind many of today's efforts towards natural language programs and also the grandmother of all chatbots:

‘Almost anyone with a reasonably orderly mind can become a fairly good programmer with just a little instruction and practice. And because programming is almost immediately rewarding, that is, because a computer very quickly begins to behave somewhat in the way the programmer intends it to, programming is very seductive.’ (1984: 277)

Are such programmers today’s freaks? The isolated shepherds of their data-flocks? It has become commonplace to identify Asperger’s Syndrome with hackers and programmers but these are the most recognisable examples of such drives. How many little numerical disorders exist in our habits? Stepping on the cracks in the pavement an equal number of times with each foot. Remembering numbers. Being in a couple. There are vast populations of numerical patternings running through the populations of our heads.

Weizenbaum goes on to note that the educational system is ideally structured, and present at a moment in a person’s life when they are easily enraptured and absorbed by such facility, usually without any fundamental questioning. Here we see the seductive power of arithmetico-material drives, the imaginal space they open up, especially in the fast, low friction world of computation, a world where one standard object acts upon another, acting upon another and another, in an infinitely seductive and rapidly changing infinite regress through layer upon layer from interface, through strata of code to circuits and beyond. Under digital abundance each generation of programmers is a processor cycle, the completion of a loop of instructions, more fuel for the explosion mapped by figures of perpetual geometric increase such as Moore’s Law. If, for Darwin, ‘death is the blind sculptor’ of geometric increase in life, what is it that provides friction, a test of fitness for arithmetico-material drives under conditions of digital abundance? In order to understand the aesthetics by which this sculptor or perspectively-delimited artist operates, a politics of numbers and of the mechanisms of calculation and life is required. In other words, what are the nomograms that describe or synthesise contemporary arithmetico-material drives?

First of all, viruses and worms. One could almost transpose the glorious terms with which Marx describes his reading from the British Government's blue books of industrial statistics, mapping the growth of factory production, or his (by today's standards rather modest) tripping on the stock market, straight onto the tales of the massive escalation of viruses. 2003 saw the *Slammer* infect 75,000 servers in ten minutes; the *Blaster* worms followed for PCs; *Sobig.F* had, at one point nearly four percent of all email traffic as its vector of propagation. The various versions of *MyDoom*, at the beginning of 2004 took that to five percent. *Netsky.D* 'has broken the records for the speed at which it has spread, having infected over 200,000 computers within hours of its detection' (*New Scientist* 2004: 5).

It takes statistics, the creatures of the avalanche of numbers, to describe these plagues of logic. One can only experience them, as a user, at the interface of a PC, or as a systems administrator viewing internet traffic logs. That is to say that the perceptual tools available to understand and sense into the passage of viruses and the materiality of networks are limited. We are left with as much sense of things as a viewer of glitch art<sup>4</sup> - an accidental scalarly defined aperture into a process occurring outside of the interface we are assigned. A question is whether the position of the human or the user is a perspectival scale which is able actually to grasp such processes except as a kind of residue.<sup>5</sup>

Some projects, such as the *Human Cellular Automaton* or much of the catalogue of experiments compiled by socialfiction.org, work directly to make arithmetico-material drives palpable by moving software outside of the casing of the computer.<sup>6</sup> In another resource for such work *Crowds and Power* (1992 [1960]), Elias Canetti attempted to provide a typology of such cloudbursts of behaviour in urban crowds, with an emphasis on the abuse possible by their actors' at least partially unconscious involvement. As distributed and modularised patterns of behaviour and information become part of the general imaginary, the available repertoire of understood ways of doing things, we can begin to see self-aware and often wittily gratuitous conjugations of social forms and arithmetico-material

drives. Phenomena such as the wave of Flash Mobs generated in 2003 provide contexts in which a growing literacy in the open combination of loosely uniform behaviours (often directly working on pop-science concepts such as complexity and emergence) produce a palpably different consistency of interactions.

But let us recoup; scientific idealism, of which numericalisation is a form, achieves historical agency.<sup>7</sup> It works. As it does so, it gains the capacity to forge elements - at a certain scalar level - to a schema which enables them to reproduce the qualities and behaviours of ideal objects. (It is the reproduction of, not full conformity to, such schemas that is suggested here.) It does so by means of numbers and relations between them. This achievement - and it is a significant one, achieved in part by a massive determination to pay careful and comparable attention to the world - has however, two problems, or more accurately - openings: that of scalar perspectivalism, in which dimensions of relationality of an object are occluded or functionally shorn off; and the relative incapacity to describe non-metrical activity by the interaction of metrically defined parts, that is, the relation between intensity and extensity.

The context of software amplifies on a massive scale the condition of multiple layers of standard objects interacting at calculationally accelerated speeds, and which indeed provides the mechanism by which further arithmetico-material cloudbursts are engendered and delivered.

There is a small group of Perl poems by the artist and programmer Harwood, a member of the group Mongrel, that I think capture some of what it is to provide a nomogram, a sensorial device into these cloudbursts. Freaks of number, the paragons of the unnatural, condense calculational power into themselves, they boil days of computation by hand into a few seconds of technique and neurotic power. Arithmetico-material drives burst out of bodies, feed off them, turn them into fuel.

In *London.pl* a poem usefully annotated by Florian Cramer for the *Run\_Me*

repository,<sup>8</sup> Harwood provides a means, through software, of sensing into these drives. If, for Hacking, the avalanche of numbers is a way of describing the birth of statistics and the gradual generation of a form of control based on the modulation of populations, here it is a means of reversing such a process and rebuilding part of the capacity of the bodies of those turned to fuel by capitalism and the arithmetico-material drives of industrialisation.

The poem is a rewrite, a plagiarism, of William Blake's 'London' (1791). Published in the book *Songs of Experience* in the last decade of the eighteenth century, this vivid burst of rage is only sixteen lines long, yet it manages to impress a profound set of sensations. The predominant sensorial impression is that of breaths, combined with political, economic and social violence, breaths as the marker of rancorous suffering life: cries, cries of fear, voices, bans or proclamations, cries of chimney-sweeping children, sighing soldiers wrecked by the wars between the competing imperiums of England and France, cursing harlots, and screaming babies. Blake makes a robust and defiant list of the ravages of society governed by access to the simultaneously abstract and brutally factual apparatus known as money. What is charter'd, isolateable as property, made 'proprietary' as the poem reversions it, is urban life.

In the hashed comments to the poem we see the following:

```
# NAME
# London - Simple Act Redress
# The American War was the last judgment on England.
# Inoculated against the sewer. Albion's Angels
# Rise up on wings of iron & steel, spreadsheet & rule:
# To gift sanitation & sulphurous fire to:
# The wheat of Europe,
# The rice of Asia,
# The potato of America,
# The maize of Africa.
# Massacre-bloated, angels crawl from the corpse of war.
# Five times fatter than when they entered.
```

Here, the systems of commodification, health standardisation via immunisation, and war are built upon the disastrous repression of the English revolution, the massacre of potential futures by the dictatorship of Cromwell, and the introduction of new energy sources to populations via the parasitical use of colonies. Spreadsheets and rulers, metrical systems are fuelled and changed by the capacities of metals and the populations working them.

In *London.pl*, Harwood takes statistics of average lung capacity, height, life-expectancy of particular ages and class populations in this era, turns them into a variable for a program to compute the volume, length and number of screams that such a number of such a typical set of sizes of lungs could produce. In the words of another text, ‘pushing’ the resulting quantity of air, ‘through a speaker system in the waveform of a scream’.<sup>9</sup>

Screams in poetry are often the representatives of an unnameable thing, a burning kernel of anguish which represents the soul and is inaccessible to language. *London.pl* by contrast, sharing this with some of the work of Diamanda Galas on the plague of AIDS or the resolutely and rightly obscene monuments to the massacres in Rwanda, shows how much this screaming is caught up in systems of numericalisation and acceleration through the operations of calculus.

After making these calculations of numerically induced screaming, the poem, as a program then sets an output for the results: an as yet unwritten Perl module `PublicAddressSystem.pm`. The comments in the program read:

```
use PublicAddressSystem qw(Hampstead Westminster
                           Lambeth Chertsey);
# PublicAddressSystem is an I/O library for the manipulation
# of the Wheelen Vortex4 129db outside warning system.
#
# from Hampstead in the North, to Peckham in the South,
# from Bow in the East to Chertsey in the West.

# Find and calculate the gross lung-capacity of the children
```



```
# screaming from 1792 to the present calculate the air
# displacement needed to represent the public scream
# set PublicAddressSystem instance and transmit the output.
# to do this we approximate that there are 7452520 or so
# faces that live in the charter'd streets of London.
# Found near where the charter'd Thames does flow.
```

The soot-encrusted burned skeletons of children are still lodged in the heads, the chimney stacks of London, the screaming is still going on. This poem, designed to be reversioned as an actually functioning program attached to a PA, provides a way in which two scales, at which this violence simultaneously occurs, can be sensed into and thought. At the level of a numerically recognisable 'fact', an account of voices disappeared from history, and at the level of an arithmetico-material drive, a way of understanding this process as systematic. Here, we are all freaks of number. Calculation machines are here built into bodies, lives are deleted, burnt up, expended, but they are also the means by which they can be understood and, like the calculation machines of D'Ocagne, turned to make accounts.



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## NOTES:

1. Since writing this text, I note that a third edition, from 1928, is published in English, trans. J. Howlett and M.R. Williams, Charles Babbage Institute reprint series (1986), History of Computing, Cambridge, Mass.: MIT Press and Los Angeles: Tomash.
2. According to the page, 'Mathematicians of the African Diaspora' maintained by Dr. W. Scott Williams, Professor of Mathematics of SUNY, Buffalo, Tom Fuller died at the age of eighty in 1790 <[http://www.math.buffalo.edu/mad/special/fuller\\_thomas\\_1710-1790.html](http://www.math.buffalo.edu/mad/special/fuller_thomas_1710-1790.html)>. Further brief speculation about Fuller can be found in, E.W. Scripture, 'Arithmetical Prodigies', American Journal of Psychology, vol.4, no.1. April 1891. A more developed survey of mathematical prodigies of the period, and giving further information about many of the people cited by d'Ocagne is, Frank D. Mitchell, 'Mathematical Prodigies', American Journal of Psychology, vol. 18, no.1, April 1907. Both papers can be found on the same page on memory techniques, games, card sharpening and magic tricks maintained by Oleg Stepanov at <<http://users.ik.net/~stepanov/mnemo/>>.
3. A useful survey of electronic portraiture, including a number of uses of facial morphing and computer-generated personalities is given in a lecture by Jasia Reichardt at the Tate Gallery site <[http://www.tate.org.uk/audiovideo/wnmwn/live\\_wnmwn.htm#reichardt](http://www.tate.org.uk/audiovideo/wnmwn/live_wnmwn.htm#reichardt)>.
4. Glitch Art <<http://www.beflix.com/index.html>>.
5. See, for two texts clarifying scalar perception, Edwin A. Abbott, Flatland: a Romance of Many Dimensions, Dover Publications, and Ret Marut aka B. Traven (1981) 'The Scarf', in To The Honourable Miss S and Other Stories, Sanday: Lawrence Hill.
6. A performance script from 1999 which has participants acting as a cell in a Game of Life; also see <<http://www.socialfiction.org>>.
7. Though of course, not all, or even most scientific idealisms do so: the notorious example is that of Lysenko, documented in detail in Lecourt's A Proletarian Science? (1977).
8. See <<http://www.runme.org/project/+londonpl/>>.
9. See Lungs at <<http://www.scotoma.org/notes/index.cgi?Lungs>>.

## REFERENCES:

- J.G. Ballard (1990) War Fever, New York: Farrar Strauss Giroux.
- Walter Benjamin (2002) 'Edward Fuchs, Collector and Historian', in Walter Benjamin: Selected Works, Vol. 3, Cambridge, Mass.: Harvard University Press.
- Elias Canetti (1992 [1960]) Crowds and Power, trans. Carol Stewart, London: Penguin.
- Charles Darwin (1985) The Origin of Species, London: Penguin, London.
- Ian Hacking (1990) The Taming of Chance, Cambridge: Cambridge University Press.
- Georges Ifrah (2000) The Universal History of Numbers, vol. 3: The Computer and the Information Revolution, trans. E. F. Harding, London: Harvill Press, London.
- Dominique Lecourt (1977) A Proletarian Science?, trans. Ben Brewster, London: New Left Books.

Maurice d'Ocagne (1905 [1893]) *Le Calcul Simplifié par les Procédés Mécaniques et Graphiques*, 2nd ed. Paris: Gauthier-Villars.

Ilya Prigogine & Isabelle Stengers (1985) *Order out of Chaos: Man's New Dialogue with Nature*, London: Flamingo.

Joseph Weizenbaum (1984) *Computer Power and Human Reason: from Judgement to Calculation*, London: Pelican.

'Internet Havoc', *New Scientist*, 6 March 2004.

# ROOTS CULTURE: FREE SOFTWARE VIBRATIONS INNA BABYLON

Armin Medosch

- + In this article I want to focus on free software as a culture. One reason for doing so is to make it very clear that there is a difference between open-source and free software, a difference that goes beyond the important distinction made by Richard Stallman. Now the notion of ‘free-as-in-freedom’ software is taken further in ways he could not possibly have imagined (Stallman 1996). Secondly, I want to show that at least one particular part of the free-software scene shows all the traits of a culture, a notion that is understood by the protagonists and is made explicit in the way they act. When it is rooted in culture, software development becomes a discipline distinct from engineering, and social and cultural values are invested in the work.

## **Rasta Roots and the ‘Root’ in Computing**

The first part of the title, ‘Roots Culture’, is designed to resonate simultaneously with the hacker’s pride in being the ‘root’ on a Unix system and with Rastafarian reggae ‘roots’ culture. In a file system, the root is the uppermost directory, the one from which all other sub-directories originate. In Unix-style operating systems (including GNU/Linux), ‘root’ is also the name of the superuser account, the user who has all rights in all modes and who can set up and administrate other accounts. Roots reggae is a particular type of reggae music with heavy basslines and African rhythmical influences. Roots reggae originated in Jamaica and is closely associated with Rastafari. Rastafari is sometimes described as either a sect/religion or a sub-culture, but neither of these definitions does justice to the

diversity of the phenomenon. It is better, therefore, to follow Paul Gilroy, who suggests seeing Rastafari as a popular movement whose 'language and symbols have been put to a broad and diverse use' (1997: 251). It originated in Jamaica in the 1930s and took some inspiration from the black nationalism, Pan-Africanism and Ethiopianism of Marcus Garvey. Through Rastafari, the African Caribbean working class found a way of fermenting resistance to the continued legacy of colonialism, racism and capitalist exploitation. It is eclectic and culturally hybrid, drawing from a range of influences, such as African drumming styles, African traditions in agriculture, food and social organisation,<sup>1</sup> and American Black music styles such as R&B and Soul. The central trope of the Rastafari narration is that Rastas are the twelfth tribe of Judah, living in captivity in Babylon and longing to go back to Africa, identified as a mythical Ethiopia. Making good on this promise is African Redemption.

Gilroy describes Rastas as an 'interpretive community', borrowing this phrase from Edward Said. The ideas and stories of Rastafari 'brought philosophical and historical meaning to individual and collective action' (Gilroy 1997: 251). Through the enormous success of reggae, and in particular Bob Marley and the Wailers, Rastafari became popular throughout the world in the 1970s and now many non-Jamaicans sport Rasta hairstyles - dreadlocks - and dedicate themselves to the music and the activity of ganja-smoking. In the UK, versions of Rasta culture have now spread through all ages and ethnicities<sup>2</sup> and it is probably the most consensual popular culture in Britain today. Even though aspects of it have been heavily commercialised, and it was unfashionable for a while, roots reggae has recently made a strong comeback. The reason for this can only be that it is more than a music style or a fashion (not everybody with dreadlocks is a Rasta, and not every Rasta wears 'dreads'), and is a culture in a true and deep sense (the meaning of which I will come back to later). 'Roots' influences can now be found in Hip Hop, Jungle, Drum & Bass, 2Step and other forms of contemporary urban music.

The two notions - the 'root/s' in computing and in Rastafari - are to be understood

not in any literal or narrow sense but as points of association and affinity and, therefore - tying the two narrations into a knot - as a potential point of departure for the 'radical social imaginary' (Castoriadis 1997a: 269).<sup>3</sup> Neither Rastafari nor hacker culture are without problems of their own. Rastafari, for instance, tends to be a very male culture, where homophobia is rife and women suffer a subordinated role in the midst of a supposed liberation struggle (see Durham 1998). I have chosen the Rastafari theme for a number of reasons, the main one being that it has developed a language of revolution. The symbolism of this language with its focus on stories about resistance and the struggle for freedom, peace and justice has proved to be very effective, judging by the massive reception it has received.

This story has resonated far beyond Jamaica and the urban African Caribbean communities in Britain and the USA. Roots Reggae, as a form of music and a liberating myth-making machine, is huge in Africa. The message from the West Indies has encouraged artists like Thomas Mapfumo, the 'Lion of Zimbabwe', to stop playing cover versions of American R&B and be true to his own African roots in his music-making, and to support the liberation struggle against the government of what was then called 'Rhodesia'. In Salvador de Bahia, the centre of African Brazilian Culture, every bar is adorned with the portraits of Bob Marley and Che Guevara. It is no coincidence that in the 1970s Salvador was the birthplace of 'Tropicalismo', a Brazilian form of 'roots' music played with drums and modern electric/electronic instruments. Thanks to its eclectic and hybrid nature, Rastafari lends itself to adoption by other communities and cultures. The experience of the diaspora, central to the Rastafari story, is shared by many people who feel displaced and uprooted, even though they may live in the land where their grandparents were born. This is well understood by some of the musical protagonists of Roots music, who encourage the 'togetherness' of all those who feel alienated in the societies they are living in. Humble Lion from the Aba Santi sound system in south London says:

'Ultimately, people who are like us, who hold similar attitudes, will gravitate towards us, because we are aiming for the same virtues that they are, and this

creates something a lot better than what society stands for. Right now, it's obvious that our societies are controlled by money, polarised, xenophobic. The major world powers back their puppet leaders and the media sanitises, separates "spectators" from reality. [...] I have to say that now it is not only the black youths who are suffering in this land, so to me, increasingly, the true inner meaning of Rasta is not concerned with colour.'<sup>4</sup>

Hackers, young and old, have their own reasons for feeling alienated in society, one of which is the misrepresentation of their creed in the media. Originally, 'hacking' meant no more than feeling passionate about writing software and pursuing this interest sometimes outside the norms, which would not necessarily imply anything illegal. The original 'hackers', such as Richard Stallman, were in any case employees of research institutions like MIT, so they could hardly be regarded as being outside and against the 'system'. But in the 1980s, during the boom in computer-science research sponsored by the military pursuing projects such as Strategic Missile Defense and Artificial Intelligence,<sup>5</sup> the mood in these ivory towers of research - which had been fairly liberal in the 1970s - changed (Edwards 1996). Mavericks like Stallman left and people outside the state-sanctioned system were perceived as a potential threat to national security. In the mid 1980s, secret services and other law-enforcement agencies began their 'war against hacking', with a compliant mass media doing their best to stigmatise hackers as criminals, or even terrorists.<sup>6</sup> With the mass adoption of the internet in the 1990s a new type of 'hacker' emerged, the so-called 'script kiddies', who under the new circumstances did not have to develop a deep knowledge of computers, as cracking tools had become relatively easy to obtain. Script kiddies, who are not regarded as 'real hackers' but are called 'crackers' by others, have developed an obsession with breaking into web servers, obtaining 'root' privileges and leaving behind digital graffiti on the web server's homepage. This activity was used to legitimise an even stronger criminalisation of 'hacking', and allowed centrally owned mass media to continue to denounce computer subcultures in general with full force. Welcome to Babylon!

## Hacker Ethics

The factional wars between different types of 'hackers' are bitter and full of mutual recriminations and I have no wish to put myself in the firing line, especially as the fighting sometimes rages over topics whose relevance to the bigger picture I completely fail to understand (such as which 'free' version of BSD - FreeBSD or OpenBSD or NetBSD - is the better or 'truer' one, i.e., truer to the spirit of hacking). In view of this, I would warn against believing what this or that group says or what the media may choose to highlight. The denouncement of the script kiddies from within the hacker scene also seems to be missing the point. Certainly, older 'real' hackers are fed up because the 'kiddies' give the state a pretext for further repression of freedom on the Net. And for any system administrator, dozens of script-kiddie attacks a day are more than just a minor nuisance. Last but not least, script-kiddie vandalism can be so blind and mindless as to wipe out cultural servers like Thomas Kaulmann's Radio Orang.org, a collective resource for experimental music and radio art which was destroyed two years ago after being nursed for six years. Nevertheless, the online graffiti produced by the kiddies can sometimes reach the level of a native computer art that has aesthetic and political qualities of its own, and is related to other native computer arts such as the work produced by the 'demo scene' - forms that live outside the highly rewarded and institutionalised system of computer, media and net arts. Being a script kiddie can be a step on the ladder to greater skill and social awareness.

Leaving script kiddies and crackers aside,<sup>7</sup> what can be identified as a common theme, transcending the internal, factional hacker wars, is the ethical code that 'real' hackers share in relation to computers and networks (Medosch & Röttgers 2001). Central to this ethical code is the rule that they *must not disrupt the flow of information* and *must not destroy data*. It is not my intention to idealise hackers as freedom fighters of the information age, but it must be said that their ethics stand in marked contrast to the behaviour of the state and certain industries who do their best to erect barriers, disrupt communication flows and enclose data by various means, including threats of breaking into the computers



of users who participate in file-sharing networks. This hacker code of ethics has been developed as a shared commitment to a 'live-and-let-live' principle. It is an ethos that is borne out of love for the craft of hacking and the desire to let as many people as possible benefit from sources of knowledge. 'Hackers' may not represent one homogeneous group, and may be split and divided into many subgroups, but what unites them is their view that hacking is more than just writing code: it is a way of life, and it has many aspects of a culture. Hacker culture has developed its own ways of speaking, certain types of geek humour and even a kind of a dress code. Hackers regularly meet at conventions - some highly publicised, others more subterranean, with an atmosphere more closely resembling that of a large family or tribe on a picnic than any sort of formal 'meeting'.<sup>8</sup> From this point of view, there are similarities between hackers and Rastafari.

### **The Hijacking of Free Software**

As Ur-Hacker Richard Stallman makes clear whenever he speaks in public, there is not much difference between open-source and free software in the way the software is developed *technically*; and most free and open-source software packages are also protected by the same licence, the General Public License (GPL) developed by Stallman with the support of New York City Columbia University law professor Eben Moglen. However, according to Stallman, there is a profound difference insofar as free software is linked with a political concept of freedom centred on freedom of speech. The term 'open source' was introduced by a group of pro-business computer libertarians in direct opposition to this political position. Eric Raymond and others proposed open source to make the idea of releasing source code and developing software collaboratively more appealing to IT investors in the USA. In that sense, this move by the proponents of open source was fantastically successful: it opened the way for IPOs by Linux companies at the height of the New Economy boom and drew the attention of companies like Sun and IBM to the existence of open source as a potential antidote to the market dominance of Microsoft. Many open-source developers make it very clear that they see themselves as engineers and engineers only, that

they have no interest in politics and are glad to leave that to the politicians. It is easy to see how this more uncontroversial orientation of open source could quickly get the support of business-people and of the many software developers whose main concern is to be able to make a living from their programming skills. Since the launch of the open-source bandwagon, Richard Stallman has been on a kind of a mission to remind the world that free software is about 'free' as in 'free speech', not 'free beer'. He also keeps reminding us that the Linux kernel could not have been written without the GNU tools and libraries, and that therefore it should always be called GNU/Linux. Stallman's style of oratorical delivery does not appeal to everyone, however, and with his evangelical zeal he manages to annoy even people who like and support his concepts. The promotion of the type of freedom that is implied in free software needs support, and even his notion of freedom of speech leaves some space for further exploration and a widening of dimensions.

### **The Whitewash: Hegemonic Computer and Internet Discourse and the Denial of Difference**

'Constructions of race in the form of mental images are much more than simple indexes of biological or cultural sameness. They are the constructs of the social imagination, mapped onto geographical regions and technological sites.' (Harwood)

The predominant social imaginary of computer science and the internet is a whitewash. This whitewash is the product of an entanglement of historical developments, the creation of certain 'facts on the ground' and a hegemonic discourse led from the centres of Western power (which includes Japan). The starting-point here is the development of Western rationality and science, from the early Renaissance onwards, associated with heroes of the various scientific revolutions such as Descartes, Leibnitz and Newton. Cartesianism, with its positing of a space for abstract reasoning through which alone the divine rules of nature can be identified, must bear the brunt of the criticism for this botched project (see Descartes 1989).<sup>9</sup> As Donna Haraway has pointed out, from the very

beginning the rise of rationalism and the scientific worldview bore the stamp of negative dialectics:

'I remember that anti-Semitism and misogyny intensified in the Renaissance and Scientific Revolution of early modern Europe, that racism and colonialism flourished in the travelling habits of the cosmopolitan Enlightenment, and that the intensified misery of billions of men and women seems organically rooted in the freedoms of transnational capitalism and technoscience.' (1997: 2-3)

Computer science has its roots in the military-industrial complex of the Cold War era. The dominant social imaginary was one of containment, of separating the world into zones of influence distributed between America and the Soviet Union, divided by electronic fences and locked into each other by the threat of mutual annihilation. Early computer projects received huge funding injections once it was recognised that computers could play an indispensable role in air defence and 'smart' guided ballistic-missile systems (Edwards 1996). The cyborg discourse of Cold War think-tanks such as the Rand Corporation and research centres like MIT generated the imaginary signification of Artificial Intelligence - a brain without a body, an intelligence that does not come from a womb but is constructed by scientists in a laboratory. It is easy to see how in this 'dream' of AI, which conducts itself so rationally, Christian ideas live on (Barbrook 1996).<sup>10</sup> The computer brain has a god-like omni-science. With the internet, conceived in the same laboratories of the Western scientific élite, sponsored by DARPA, the AI brain was to grow nerves that would soon stretch around the globe and, via satellite, would gain a god's viewpoint in space from which the earth looks like a fragile little blue ball. Omni-science plus omni-presence equals omni-potence - but perhaps only (certainly mostly, in any case) in the imaginations of the protagonists of this 'vision'.

The internet, based on Western communication protocols, constructed by Western males, is imagined to be populated mostly by white and relatively affluent people. This may have been the case in 1995, when approximately 20 million people used it, but certainly does not match the true demography of the

net in 2004, with its more than 600 million users and highest growth figures in countries such as China and India. The whitewashed mass-media discourse continues to associate the net with a Western - and in particular American - world-view and an ultra-libertarian, anti-socialist political programme. The assumption of a non-gendered, non-ethnically defined cyberspace automatically makes cyberspace 'white', a colour blindness that is inherently racist.

### **Academic Techno-Topia**

'Bobby Reason was born weak from typhus fever and unable to crawl away from his body of infection. He spends his time passing voltage through the pathways of least resistance to help him amplify, copy, and replay sounds. Extending his ears to where his eyes used to be, he forms lenses to put in place of his imagination. Whilst doing so he manages to split light and holds the lower end of the spectrum (radiation) with special tools he forged out of the industrial revolution to replace his hands. And after all is done, he gets out the air-freshener to replace his nose.' (Harwood 2004)

Since the early to mid 1990s, the internet has spawned an elaborate theoretical discourse about itself in books and, mostly, on the net. The more mainstream currents of this discourse hailed the net as a force that would bring about a more democratic and egalitarian world. Unfortunately, however, the net was again imagined as a kind of homogeneous zone, free of connotations of gender, race or class division,<sup>11</sup> where the only distinction identified was the existence of a 'digital divide' - the realisation that the promise of the net could not be fulfilled until all people had access to it. The digital-divide discussion, well-meaning though it may have been, only proliferated another version of Western hegemonic thinking with its rhetoric of 'access': there is the net - based on open standards, egalitarian, global, democratic and hard to censor - and we have to give 'those people' down in Africa or elsewhere access to it. In this one-sided, US/Euro-centric version of internet 'freedom', it was not imagined that the net itself could become a more diverse cultural space and that even its technical protocols might be 'mongrelised'. The narration of the internet as the success story of Western

rationality and the scientific worldview did not allow for such digressions.

Theoretical internet discourse very early on embraced open standards, free software and open source. The principles embodied in TCP/IP and the GPL would guarantee freedom of expression and communication. The discourse produced by internet intellectuals tended to highlight abstract principles enshrined in code and, in so doing, by default prioritised its own values inherited from 500 years of book culture. American cyber-libertarians even went so far as to call the space of lived reality by the derogatory term 'meatspace'. The well-meaning leftist liberal discourse about the net had got caught in the classic Cartesian trap of mind/body duality.

Left-wing internet intellectuals adopted Free, Libre, Open-Source Software (FLOSS) as a potential saviour from the corporate world, yet in doing so they were following the same old patterns of thought. Too often only the abstract qualities of FLOSS are highlighted: the 'viral' character of the GPL, the net's property of being highly 'distributed', the 'meshed network topology' in wireless networking, the importance of 'copyleft principles'.<sup>12</sup> What receives far less consideration is the fact that these principles and abstract values in and of themselves do nothing at all without human agency, without being embedded in communities who have internalised the values contained in those acronyms. The proactive making and doing by humans - in other words, 'labour' - is once more written out of the story. The desires and passions invested in the writing of program code get little 'airtime' in FLOSS discourse. In this sense a certain type of FLOSS discourse can be seen as another extension of the project of Modernity with its preference for abstract reasoning and the codification of knowledge. The values and norms of society - formulated as a Bill of Rights or the UN Charter of Human Rights - are called inalienable and universal rights and freedoms but in fact exist mainly on paper: politicians like to quote them in Sunday speeches, but they are quickly forgotten the next morning, when business as usual kicks in.

The relationship between code as program code and as an ethical or legal code,

and the importance that Western societies assign to it, is a very broad topic which I cannot explore in detail here. I would only like to say this much: generally speaking, putting one's faith in abstract 'truth' alone - truth that has cut its ties with lived reality and becomes transcendent to society - means creating a form of absolutism.<sup>13</sup> The divine power of God returns, through the back door, to 'rational' discourse. Abstract, transcendent truth takes away the individual and collective freedom of people to make their own decisions, and subjects them to the rule of a truth that is already given, independent of history and the situatedness of being (see Castoriadis 1997b: 338-348).

If FLOSS discourse cuts itself off from the roots of culture, it empties itself of all meaning. The 'free' or 'libre' in FLOSS is not given once and for all by being laid down in the GPL - it is a freedom that needs to be constantly worked out and given new meanings by being connected to situations, to concrete social struggles. The content of this freedom cannot be understood in the abstract - it needs to be created in the actuality of sensual and bodily existence, which is, by the way, the only thing that really makes 'sense' (see Merleau-Ponty 1992).<sup>14</sup> By following the default patterns of Western rationality, academic FLOSS discourse runs the risk of generating a vacuous fiction, an idealisation that lacks body, guts, feelings, sex, pain, joy and everything else that makes life worth living.

### **Culture and the Social Imaginary**

The term culture can subsume all those human activities that are not directly utilitarian, which do not serve, in a narrow way, the goal of material survival. Yet at the same time culture is an indispensable component of human life, without which communities or societies could not survive. Culture provides the cohesive element for social groups; it motivates the actions of individuals and groups. I use the term motivation here not in a trivial sense, as when an athlete is asked by television sportscasters about what 'motivates' him or her. What I have in mind is closer to the German word *Leitmotif* that roughly translates as 'guiding idea'. But it would be wrong to imagine those 'motives' as something outside culture or social reality. They are at the centre of the social life of societies, anchoring

it, but also giving it direction. This concept of motives is closely related to the concept of values. It would be wrong to say that something is 'based on' values, because values can be both implicit and explicit, internal and external. Here we cannot use architectural metaphors of foundation and superstructure. Culture is not the only, but clearly one of the most important forces, behind the creation of values and motivations, of 'making sense' and 'giving meaning' to our existence. Society, in a constant state of self-creation, develops social imaginary significations through cultural feedback loops. In this sense, culture is not just limited to cultural representations in various media forms, but is constantly realised in the actions and interactions of everyday life. Culture 'finds expression' in various ways, in how people dress, what they eat and how it is prepared, in social protocols and forms of behaviour. The social and cultural knowledge of a society is expressed in those forms, in both the patterns of behaviour of everyday life and in explicit cultural representations.

Unfortunately, Western society has developed a hierarchy of different forms of knowledge, with hard science at the top, social sciences somewhere in the middle and culture *per se* at the bottom. The positivistic divide claims that what can be described in scientific language, logic, mathematics, theorems, is the only form of objective knowledge, whereas the rest is regarded as the soft underbelly, as a somehow lesser form of knowledge. Philosophers and historians of science have argued that the claims that science progresses only through rational methods and in logical steps are not true. Many other factors inform the conduct of scientific research and development: politics and the economy, cultural and sociological factors, funding and institutional structures, belief systems and tacit knowledge. Despite the well known works of authors such as Kuhn and Feyerabend, and later Latour and Haraway, and an ongoing investigation into what 'informs' science from many different viewpoints (anthropology, sociology, cultural studies, etc.), the results of techno-science are invariably presented as ideologically neutral and free of contingent forms of social knowledge. Computer science, which is conventionally understood to be closer to engineering than to basic research, is presenting itself as a hard science. The conventional views about software

development deny the link between software and culture as something that comes *before* the actual creation of the code. Yes, software is understood to facilitate the production of cultural representations and to influence culture by the tools that it makes available, but it is usually not seen to be a product of social imaginary significations.

I have tried to describe the true content of culture as a form of knowledge, as ‘immaterial’. Nevertheless, culture is quite obviously also ‘material’ and has various economic aspects. Cultural values define which objects are desirable, what gets produced and what is left out. The production of cultural representations is of course a form of human labour and therefore always includes economic transactions, independent of the form of the exchange value, if it is based on money or other forms of exchange. The commodification of the production of culture in capitalist economies has been criticised by the Frankfurt School in the early 20th century. Now, at the beginning of the 21st century, this work, even if some of it is flawed,<sup>15</sup> gains heightened significance as the commodification of culture reaches unprecedented levels.

The culture industry has been re-branded as ‘creative industry’, and is seen by many governments of overdeveloped countries, particularly in Britain, as a central plank in government strategies for economic growth and urban development (i.e. gentrification). Problems are aggravated by the aggressive conduct of the copyright industries, and the power of media conglomerates who have become highly integrated and own production companies, distribution channels and advertising agencies. Each of these industries has become highly oligopolistic, even monopolistic, and their combined influence greatly controls what can be seen or heard, and how it is distributed. New borders have been created by various means such as copyright, patents or the gatekeeper functions of communication providers. The exchange and transmission of cultural knowledge is now in danger of being interrupted or seriously hampered by those powerful formations.<sup>16</sup> One could go even further into the darkness of these developments and predict a closure of the cultural production of social



imaginary significations.

I have described two processes: one that excludes cultural knowledge from the official scientific body of knowledge; and one that encloses cultural knowledge in the products of the military-entertainment complex, a.k.a the creative industries.<sup>17</sup> Through both, exclusion and enclosure, what could happen is a lockdown on the creation of new meanings, of new powerful significations that 'rock the world'. There are already strong signs of such a lockdown in the mass conformity that is promoted by the mass media, which could only be expected and has been going on for a long time. It was disillusioning for many to see how the Internet has been tamed within a very short time-span and risks becoming just another agent of conformity. The centralisation of Internet resources, whose content is created by its users, but whose surplus value is harvested with enormous financial gain by Google and others, plays into the hands of a further centralization: web sites that are not ranked highly on Google appear to be peripheral; information which cannot be found easily on the symbolic battleground of the web appears to be marginal. However, I think that any lockdown can only be temporal and not total; that cultural production based on a more radical social imaginary will not cease but is currently operating at a reduced level. The combined totalities of government and large corporations, both increasingly using the same forms of bureaucratic rule and threatening to choke life out of the cities and the countryside, motivate powerful counter reactions. Many people find inspiration in the language of resistance created by African Caribbeans and Americans and expressed in musical styles such as roots reggae, hip-hop and underground house.

### **Rasta Science**

The West perceives itself to be in possession of a monopoly on Reason, Rationality and a particular interpretation of nature which makes it the object of science. Rasta inspired culture is seen by Western academic intellectuals, usually, with very few exceptions, through the spectacles of ethnicity. Rasta culture is dealt with as a form of popular culture which is denied the ability to be self-reflective

and to be able to criticise the ‘whole’, the central knots of Western cultural and intellectual hegemony. Counter to these claims, roots musicians and dub poets understand the ‘Babylon System’ very well and have found ways of attacking it at its heart, by using an imaginative language of resistance, by subverting the technological tools that it provides through inventing a Rasta Science and by finding ways of surviving and ‘passing on the culture’ in times of oppression and marginalisation. Rasta inspired poets such as Jean ‘Binta’ Breeze and Benjamin Zephaniah, and dub poets such as Linton Kwesi Johnson and Lee ‘Scratch’ Perry have written some of the sharpest lyrics of our time. Their poetry should be, and is increasingly perceived as some of the best contemporary English poetry - beyond the limitations of being put into an ethnic ghetto. Central tropes in their work are the injustice dished out by global institutions like the IMF, the murderous potential of technoscience and of industrial scientific warfare in the interest of capital, and the ongoing discrimination through the agents of institutional racism, such as the police. Their work does not exist in isolation but breathes an oppositional spirit that has been worked out over decades, if not centuries, and has found entrances into everyday Rasta language (Breeze). Rastas have created alternative linguistic reference systems based on Jamaican patois and Creole English. For instance, Rastas say ‘overstanding’ instead of ‘understanding’, because the latter would imply submission. The Internet, of course, becomes the ‘Outernet’, an interview an ‘outerview’.<sup>18</sup>

The ‘dub’ style created in the early 1970s by King Tubby and Lee ‘Scratch’ Perry introduced a technological element into reggae music, keeping the ‘roots’, but working with echo, tapes, noises, reverb and other special effects. Music making became a ‘science’ (Davis 1997)<sup>19</sup>; in the 1980s this was reflected by the names of dub artists such as Mad Professor and The Scientist. During those years, the times of the nuclear arms race in the early 1980s, the critique of Western capitalist science as producer of weapons of mass destruction was a frequent theme. Dub artists, for instance Lee ‘Scratch’ Perry with his *African Arkology*, boldly claimed to have invented another type of science:

‘I am the first scientist to mix the reggae and find out what the reggae really is.

[...] The recording studio was my spaceship that was polluted by the dreadlocks in the moonlight.'

The culture of sound systems playing out in the open or at cultural centres (almost never in regular clubs) introduced a 'scientific' element into roots culture by optimising the system of speakers, special effect boxes and amplifiers for the specific needs of roots reggae and dub. This 'Ridim of a tropical, electrical storm' did not just encourage Bob Marley style contemplation and religious mysticism but kept alive the 'flame of historical yearnin' (Johnson). The recognition of the need for a fundamental change of society is expressed through a particular form of translating the music recorded on a vinyl disc into a sound experience which is so intense that it becomes cathartic; as a group experience it does not only sharpen the senses and the experience of the self, but lends itself to the transformation of individual suffering into collective awareness of the breakdown of mainstream politics. The urbanised style of sound systems helped roots music to get through the oppression of the Thatcher years and re-emerge strongly in the late 1990s. The particular way of social organisation that is connected to sound systems strengthens the sense of a collective identity, of being an underground tribe where membership is not based on ethnicity but common cultural references.

The aspect of collectivism in roots culture is also expressed through the importance of the 'ridim'. The ridim is the instrumental track of a record, stripped of the vocals. It is normal still today in Jamaica that certain ridims are especially popular at a certain time, so that often hundreds of interpreters record versions with their own lyrics on top of one of the popular riddims. The ridim offers itself as the most direct analogy to the 'copyleft' principles in free software. As I have tried to show in this chapter, there are further analogies: the collective identity as an underground tribe which has its own kind of politics; the development of an alternative language and a parallel distribution system that fosters community and bypasses the controlled channels of the creative industry; and the claim to an alternative science which uses the products of Western high-tech but subverts them by putting them to very different means.

## Software as Culture

'This software is about resistance inna Babylon world which tries to control more and more the way we communicate and share information and knowledge. This software is for all those who cannot afford to have the latest expensive hardware to speak out their words of consciousness and good will.' (Jaromil)

A number of artists/engineers have started to bring software development back into the cultural realm, and they are infusing culture into software. But 'they' are a very diverse collection of people and it would be wrong to categorise them as a movement or a group. I will focus on a few specific individuals and projects. As tempting as it always is for writers to extract abstract common properties from a social phenomenon, I will also try to control this impulse because I think it is much too early for any systematic approach.

One of the earliest investigations in this area was carried out by a group called Mongrel, which was founded in 1996 in London. The group consists of Graham Harwood, Matsuko Yokokij, Matthew Fuller, Richard Pierre Davis and Mervin Jarman. Coming from different ethnic and cultural backgrounds (Irish-English, Japanese, West Indian), they chose to appropriate the term 'mongrel' which is charged with racist connotations. Their inquiry started with the realisation that software tools are not neutral but charged with social significations. In their earlier work they focused on laying bare those significations with projects such as the Mongrel Identity Kit and the National Heritage Search Engine. Mongrel opposed the clichés of Western educated liberalism and attacked the repressive 'tolerance' of the middle classes. By calling themselves 'mongrels', they claim a distance from the norms of polite society. The aggressive 'mongrelisation' of popular software programmes and search engines made race an issue at a time when the Internet was promised to be a place - cyberspace, an alternative reality - where problems of race or gender would not exist or, somehow magically, disappear. 'Mongrel' Mervin Jarman, by reminding us of the death of Joy Gardner in police custody at Heathrow airport, contrasted the free-flow of information celebrated by information society gurus with society-of-control

tendencies of the very same technologies, i.e. the techniques designed to control immigration. In those years, which may be loosely described as a first phase in Mongrel's work, they revealed that a deep universe of meanings was inscribed into what was generally perceived as just a 'neutral' software tool. Mongrel exposed the cultural conformity which is produced and reproduced by male white software engineering, through their negative and oppositional culture jamming techniques.

Mongrel later moved on from the applied critique of the social content of existing software to writing their own software from scratch. They recognised the connections between the social orientation of their work and the advantages of the LAMP package (an acronym composed of the initials of various free softwares: the operating system Linux, the webserver Apache, the database MySQL and the scripting languages Perls, Python and HP). Mongrel deliberately went into urban areas where they found economic deprivation and a huge digital divide at the very centre of Western society. By talking to and working with people who had previously had little access to the net and digital technology and who were thus denied the ability to create their own cultural representations online, Mongrel established the requirements for the software they were about to develop. The result was *Nine9*, a server side web application which enables people to create their own digital representations online without having to submit to the rigidities of corporate engineered software and the systems of language based categorisations those usually produce. Mongrel had discovered that predefined categories which are part and parcel of database applications on the web usually don't work with their user group. Any system of categorisation, any taxonomy, contains so many cultural assumptions that people who don't share the same background find it hard to relate to it. Mongrel's solution was to leave the system completely open at the start, without any categorisation. Graphically and conceptually, *Nine9* is an open and potentially (almost) infinite plane of nine-by-nine squares which can be squatted by individuals or groups and filled with content. The system establishes links between different parts of the site, not through categorisation but through establishing patterns of usage

over time. Mongrel's concept of 'social software', a term they have invented which but has since been widely abused, takes software development out of the realm of corporate software engineering and connects it with the everyday experience of people; the process of development is rooted in the real world.

'I'm in a constant state of trying to find wings that lust after the experience of transportation while being firmly rooted to the ground. I want to see people fly from present situations to other states of pleasure and pain. Out of the gutters and into the stratosphere of the imaginary.' (Harwood 2004)

### **Rastaman Programmer**

A similar technique of rooting software development in the real world is cultivated by Jaromil, a.k.a. Denis Rojo, a young Italian programmer with long dreadlocks, and the author of the bootable Linux distribution Dyne:bolic. A boot CD is a complete operating system plus applications on a CD ROM. If the computer is started or restarted with the Dyne:bolic CD inside, it boots into Linux, automatically detecting the hardware configuration and initialising the right drivers for sound and video card, and other components. Jaromil's Dyne:bolic contains software he has written himself and which specifically aims at facilitating people becoming online publishers of audiovisual content (examples are MuSe, FreeJ, Hascicam).

While the promise of the Internet revolution, that everybody can launch their own radio or TV station on the Net, might in principle be true, it is seriously impaired by a number of problems. Firstly, broadband connections might be available in Western capitals at an affordable price but this is not the case in many other parts of the world. Secondly, content created with proprietary programmes is 'owned' by the software company because it potentially controls the dissemination of the content. A further disadvantage is that because the source code is not released to the public it might be 'calling home', a hacker term for software that secretly releases user information to the parent company. Another problem is that commercial software companies usually pay little tribute to the needs of users who are financially less privileged, therefore they optimise

their programmes for high-bandwidth connections and follow the rapid update cycles of the high-tech industries.

Jaromil's Dyne:bolic tackles all these problems. Dyne:bolic is free software in the Stallman sense; everything on it is in accordance with the GPL. It is not optimized for the fastest machines but for cheap and old hardware. MuSe, the main audio streaming tool, recognises the quality of a net connection and throttles the bit rate of data transmissions accordingly. All these decisions did not come overnight and were not made automatically. Like Mongrel, Jaromil's development strategy emerged over time by responding to the needs of potential users. In 2002, he travelled to Palestine to find out which tools the democratic Palestinian resistance might need or want. One of the results of this journey was that he implemented non-Latin font sets so that Dyne:bolic can be run using Arab, Chinese, Thai and many other non-Western character sets. Jaromil explicitly connects his work on software with liberation struggles:

'The roots of Rasta culture can be found in resistance to slavery. This software is not a business. This software is free as of speech and is one step in the struggle for Redemption and Freedom. This software is dedicated to the memory of Patrice Lumumba, Marcus Garvey, Martin Luther King, Walter Rodney, Malcom X, Mumia Abu Jamal, Shaka Zulu, Steve Biko and all those who still resist to slavery, racism and oppression, who still fight imperialism and seek an alternative to the hegemony of capitalism in our World.'

### **Digital Culture: Making Good On Its Promise**

The vibrations of reggae music and a culture of resistance slowly begin to infiltrate the clean white space of hegemonic computer and net discourse. The work of free software developers such as Harwood/Mongrel, Jaromil and many others re-establishes the cultural roots of knowledge. This work is carried forward by a rebellious spirit, but in a very kind and civic way: no grand gestures, no sensationalism, no false promises, and therefore, by implication, not really having 'a career' and money to spend. This softly spoken rebellion is carried by value systems that are non-traditional, not imposed. As Raqs Media Collective

put it quite beautifully, one of the major aspects of free software culture is that people ‘take care’, they nurse code collectively, bring software development projects to fruition by tending towards shared code that is almost like a poem, a writing of an *Odyssey* in software (Raqs 2000). People involved in large free software projects don’t share code because the GPL forces them to do so, but because they want to do it. This investment, however it might be motivated, mongrelises technologies and connects emotion and passion with the ‘cold’ logic of computers.

The developments that are being made are not coming out of some mysterious, anonymous techno-scientific progress but are based on conscious choices made by people. They develop something that they might want to use themselves, or that they see as an enriching addition to what exists. The decision what to do, in which area to make an investment, is a crucial one:

‘I’m not sure I choose a project to code/maintain - it rather chooses me - I talk to the bloke who’s fixing my boiler whose life is run by computer timings or I talk to my mum who’s worried by too many phone calls trying to sell her things - I see stuff - gaps in my imagination or ability to think articulately about the experience of information and guess other people feel that as well...’ (Harwood 2004)

There are other significant projects under way in many places. One of them is the digital signal processing platform Pure Data, a software with a graphical programming interface used by many artists. Each programme can be stored as a ‘batch’ and reused by others. Real communities of users institute themselves around such projects. Their choices are expressions of cultural values. But those values are not really abstract or immaterial. They are embedded in the lived reality of the people who are involved. And so is the technology that they create. The cultural vibe of the group gives the development its meaning, its significance. Similar things could be said about individuals and groups developing free networks. For instance, at a place called c-base in Berlin, dozens of people meet each Wednesday to build aeriels, optimise routing protocols or discuss strategies



for connecting housing blocks and city boroughs. The place is alive with activity because it provides a sense of belonging, of identity, of direction. Work is mixed with pleasure and fun.

Digital culture is full of promises of revolutions, but usually the content of these revolutions is not specified. Discovering the roots of their cultures can help free software developers discover new meanings in the 'free' of free software, and engage with society through their work, and not just with the abstract reality of code. The language of revolution, of roots reggae and dub science, is surely not the only possible inspiration but can serve as an example for many other 'roots' still to be discovered.



This is a revised version of an essay published in 'Sarai Reader 05: Bare Acts', edited by Monica Narula, Shuddhabrata Sengupta, Jeebesh Bagchi and Geert Lovink, Sarai Media Lab, Delhi, 2005.

**NOTES:**

1. African ways of living were kept alive in Jamaica by the Maroons, people who escaped from the slave plantations and survived under harsh conditions in the hills in an agricultural subsistence economy based on collective land ownership. Like the Maroons, religious Rastas are vegetarians and cultivate the smoking of Ganja – the ‘herb of God’ – as a religious practice.

2. For instance, a few years ago a ‘Raggastani’ movement emerged: young Asians identifying themselves as Rastas.

3. I use the term ‘radical social imaginary’ in the sense of Cornelius Castoriadis. The term is quite central to his philosophy. It can be defined as the source of thoughts and ideas that society has of certain things. Used in this sense, the ‘imaginary’ is more than what we conventionally associate with ‘imagination’. It overlaps to some degree with the collective subconscious but is not identical with it. The understanding of the term also depends heavily on Castoriadis’ understanding of the ‘social’ and of history. He writes:

‘History is creation: the creation of total forms of human life. Social-historical forms are not “determined” by natural or historical “laws”. Society is self-creation. “That which” creates society and history is the instituting society, as opposed to the instituted society. The instituting society is the social imaginary in the radical sense. The self-institution of society is the creation of a human world: of “things”, “reality”, language, norms, values, ways of life and death, objects for which we live and objects for which we die....’ (Castoriadis 1997a: 269)

In other words, the social imaginary significations are what holds a society together. The social imaginary is the source, or as Castoriadis would say, the magma of the creation of meaning/ significations/objectives. A ‘radical social imaginary’ is then, and this is my interpretation, a source of new significations which overturn the already existing ‘instituted’ society.

4. Humble Lion, in an interview with the Get Underground online magazine <[http://www.getunderground.com/underground/features/article.cfm?Article\\_ID=785](http://www.getunderground.com/underground/features/article.cfm?Article_ID=785)>.

5. I am not claiming here that all AI research in the 1980s was sponsored by the military but that AI-related research in the US was given a second boost, after its original heyday in the 1950s and 1960s, through Reagan’s ‘Star Wars’ programme.

6. See the book Underground about the ‘war against hacking’ in its early stages. Underground is published online <<http://www.underground-book.com/>>.

7. The book Netzpiraten, Die Kultur des elektronischen Verbrechens (Medosch and Röttgers 2001), gives a more in-depth account of the differences between ‘ethical’ or ‘real’ hackers, crackers and script kiddies.

8. I am talking about the Hacklabs which are held every summer now in various countries. There is a marked difference between North European and American hacklabs, which are sometimes more geek summits than anything else, and Southern European and Latin American hacklabs, which tend to focus far more on the link between Free Software, Free Speech and independent media.

9. I would be careful not to blame Descartes for Cartesianism, just as Marx cannot be blamed for Marxism. In his writings, he comes across as far more entertaining than the school of thought his work initiated.

10. For a proper critique of the claims of ‘strong’ AI, look no further than Penrose’s The Emperor’s New Mind (1989).

11. It should be noted that there exist serious pockets of resistance to this mainstream version of internet discourse, from the Marxist discourse of Arthur and Marie-Louise Kroker in their online

magazine CTheory, to the publications of the Sarai group from Delhi, The Sarai Readers, and some of the writings published on mailing lists like Nettime. Afro-Futurism, Cyber-Feminism and a whole school of writers inspired by Donna Haraway are creating a growing body of work that corrects the colour-blind Western-centric vision of the net.

12. Admittedly, I have sometimes been saying things that sound pretty similar to the mainstream FLOSS discourse. See, for instance, the article 'Piratology' (Kingdon of Piracy 2002) or the article 'The Construction of the Network Commons' (Medosch 2004).

13. I am not against abstractions per se; abstractions can be meaningful, useful and beautiful, like some abstract art or minimalistic electronic music. I am only speaking against an abstract absolutism.

14. On this point, see, for instance, *The Phenomenology of Perception*, by Maurice Merleau-Ponty (1992). He says that perception cannot be separated into a merely mechanical receptive organ (e.g. the eye), a transmitter (nerves), and an information-processing unit (the brain). Artificial Intelligence had to learn this the hard way in fifty years of research conducted after the publication of Merleau-Ponty's book in 1945.

15. I am referring in particular to Adorno's wholesale dismissal of all products of the culture industry based on his preference for high culture. The significance or quality of a cultural representation is not necessarily determined by the economic circumstances of its production. (see Castoriadis 1997b).

16. I am keeping the critique of this process short because I assume that in the year 2004 the various frontlines of this struggle - for example, the music industry vs. file-sharing, proprietary vs. free software and the role of patents, etc. - are highly publicised and now part of common knowledge.

17. How far this attempt to enclose popular cultural knowledge goes is best illustrated by the attempt of some lawmakers in the USA to apply patent laws to fairy tales, so that grandmothers could not tell those fairy tales to children without first obtaining a licence from Disney.

18. There is a growing body of work on the Rasta use of language in cultural studies and English literature studies.

19. Erik Davis compared the experience of aural 'dub space' to William Gibson's 'cyberspace', and referred to acoustical space as especially relevant for the 'organization of subjectivity and hence for the organization of collectives', in his lecture 'Acoustic Cyberspace' (1997) <<http://www.techgnosis.com/acoustic.html>>.

## REFERENCES:

Theodor W. Adorno (1991) *The Schema of Mass Culture*, London: Routledge Classics.

Richard Barbrook (1996) 'The Sacred Cyborg', in *Telepolis* <<http://www.heise.de/tp/english/special/vag/6063/1.html>>.

Richard Barbrook & Andy Cameron, 'The Californian Ideology' <<http://www.hrc.wmin.ac.uk/theory-californianideology.html>>.

Jean 'Binta' Breeze, 'Aid' <<http://www.nald.ca/fulltext/caribb/page63.htm>>.

Cornelius Castoriadis (1997a), 'The Greek Polis and the Creation of Democracy', in David Ames Curtis (ed.) *The Castoriadis Reader*, London: Blackwell.

Cornelius Castoriadis (1997b), 'Culture in a Democratic Society', in David Ames Curtis (ed.) *The Castoriadis Reader*, London: Blackwell.

Erik Davis (1997) 'Acoustic Cyberspace' <<http://www.techgnosis.com/acoustic.html>>.

René Descartes (1989) *Le Monde ou Traité de la Lumière*, Berlin: Akademie Verlag, Berlin.

Obiagele Lake Durham (1998) *Rastafari Women: Subordination in the Midst of Liberation Theology*, North Carolina: Carolina Academic Press.

Paul N. Edwards (1996) *The Closed World: Computers And The Politics Of Discourse in Cold-War America*, Cambridge, Mass.: MIT Press.

Paul Gilroy (1997) *There Ain't No Black in the Union Jack*, London: Routledge.

Donna Haraway (1997) *Modest\_Witness@Second\_Millennium.FemaleMan@\_Meets\_OncoMouse™*, London: Routledge.

Graham Harwood, 'Ethnical Bleaching' <<http://www.scotoma.org/notes/index.cgi?EthnicBleaching>>.

Graham Harwood (2004) email to the author, 31 August.

Jaromil (aka Denis Rojo), *Dyne:bolic software documentation* <<http://dynebolic.org/manual>>.

Kingdom of Piracy (eds.) (2002) 'Piratology', in *DIVE*, London/Liverpool: FACT.

Linton Kwesi Johnson, 'Reggae Sound' <[http://hjem.get2net.dk/sbn/lkj/reggae\\_sound.txt](http://hjem.get2net.dk/sbn/lkj/reggae_sound.txt)>.

Armin Medosch (2000) 'Piratology', in *Kingdom of Piracy* (eds.) *DIVE*, Liverpool: FACT.

Armin Medosch & Janko Röttgers (eds.) (2001) *Netzpiraten, Die Kultur des elektronischen Verbrechens*, Hannover: Heise.

Armin Medosch (2004) 'The Construction of the Network Commons', in *Ars Electronica Catalogue*, Linz.

Maurice Merleau-Ponty (1992 [1945]) *The Phenomenology of Perception*, trans. Colin Smith, London: Routledge.

Lee 'Scratch' Perry, various 'outerviews' <<http://www.upsetter.net/scratch/words/index.html>>.

Roger Penrose (1989) *The Emperor's New Mind* (1989), Oxford: Oxford University Press.

Raqs Media Collective (2000) 'Value and its Other in Electronic Culture: Slave Ships and Pirate Galleons', in *Kingdom of Piracy* (eds.) *DIVE*, Liverpool: FACT.

Richard Stallman (1996), 'The Free Software Definition' <<http://www.gnu.org/philosophy/free-sw.html>>.

# **RASTA SOFTWARE: JAH RASTAFARI LIVITY BLESS OUR FREEDOM TO CREATE!**

**Jaromil**

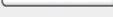
- + In the panorama of existing operating systems we see that there are a great number of possibilities to listen to all kinds of ‘free to download’ players for audio, but no easy way for everybody to speak out loud and spread their word. The way communication is structured follows the hierarchy of powers already established in babylon’s mediascapes and, worst than ever, money is the main requirement for making a voice spread and be heard by others. Nevertheless, proprietary software spreads dependence on business companies through the populace: whenever we share knowledge on how to use certain software, we encourage people to buy the tools from merchants in order to express their creativity. This is great responsibility for anyone who teaches somebody to do something with software. The need to buy is slavery under the mercantile interests of capitalism.

The roots of Rasta culture can be found in the GNU philosophy and consist of Resistance to slavery. RASTA SOFTWARE joins the struggle for Redemption and GNU Freedom. This software is dedicated to the memory of Patrice Lumumba, Marcus Garvey, Marthin Luther King, Walter Rodney, Malcom X, Mumia Abu Jamal, Shaka Zulu - and all those who still resist to slavery, racism and oppression, who still fight imperialism and seek an alternative to the hegemony of capitalism in our World.

>>



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It is **optimized to run on slower computers**, turning them into a full media stations: the minimum you need is a pentium1 or k5 PC 64Mb RAM and IDE CD-ROM, or a **modded XBOX** game console - and if you have more than one, you can easily do **clusters**.



Much blessings in Jah luv to all those who resist. Selah.

RASTASOFT

## Latest News



RASTASOFT

Here we go with version 1.4 codename **LUMUMBA**, read the [full announcement](#) and download the [torrent](#), everyone is encouraged to upgrade to this release which runs on **all Xbox models**, fixes modem dialup and upgrades most applications to complete the range of multimedia functionalities offered by dyne:bolic, with even **more speed** and **more devices** supported.

Time for juicy spring updates and bugfixes: version 1.3 is out featuring a revamped **Ogg/Vorbis streaming system**, a fix to the nesting mechanism and important **updates to audio and video software**. Don't forget to copy the dyne/ directory from the new CD to upgrade your system in case you docked the previous version! Here is the [release announcement](#).

Version 1.2 codename **DYNE:TRAX** is available for free download from mirrors, see the [release announcement](#) for the new dyne:bolic which now features a new **docking system** to run from harddisk (MUCH faster!), new **multiple rackable sound synthesis and music software** which can operate together connecting inputs and outputs, even **more video software**, wider device support and many bugfixes. All users are strongly encouraged to upgrade and experience this revamped and yet more usable version!

The new 1.1.1 version is out today, bugfix release: **if dyne:bolic wasn't booting on your machine, this will fix the problem!** Only AWARD bios computers were affected by a bug, [if 1.1 already works for you, there is no need to upgrade.](#) Thanks to all the people helping to track the problem on [our mailinglist!](#) If you already have the older iso, you can [use rsync](#) to save bandwidth downloading only differences.

Dyne:bolic was [presented](#) at the [linux expo uk](#), there is already an [article on ZDNet](#) talking about it, especially focusing on the new **xbox clustering** feature.

Updates are available to the [cd labels](#) and to the [user's manual](#), while also the infoanarchy wiki added an entry about dyne:bolic in its knowledge base.

page generated in 0.0144 secs

```
while ( love & passion ) {  
    for( ; rights < freedom ; rights++ )  
        standup( fight );  
    willpower = malloc( rights );  
    free( babylon );  
}
```



**rastasoft.org**





# **X NOTES ON PRACTICE: STUBBORN STRUCTURES AND INSISTENT SEEPAGE IN A NETWORKED WORLD**

**Raqs Media Collective**

## **+ I. The Figure of the Artisan**

The artisan stands at the outer threshold of early modernity, fashioning a new age, ushering in a new spirit with movable type, plumb line, chisel, paper, new inks, dyes and lenses, and a sensibility that has room for curiosity, exploration, co-operation, elegance, economy, utility and a respect for the labour of the hand, the eye and the mind. The artisan is the typesetter, seamstress, block-maker, carpenter, weaver, computer, oculist, scribe, baker, dyer, pharmacist, mason, midwife, mechanic and cook - the ancestor of every modern trade. The artisan gestures towards a new age but is not quite sure of a place in it.

The figure of the artisan anticipates both the worker and the artist, in that it lays the foundations of the transformation of occupations (things that occupy us) into professions (institutionalized, structural locations within an economy). It mediates the transfiguration of people into skills, of lives into working lives, into variable capital. The artisan is the vehicle that carried us all into the contemporary world. She is the patient midwife of our notion of an autonomous creative and reflective self, waiting out the still births, nursing the prematurely born, weighing the infant and cutting the cords that tie it to an older patrimony. The artisan makes us who we are.

Yet, the artisan has neither the anonymity of the worker drone, not the hyper-individuated solipsism of the artist genius. The artisan is neither faceless, nor a

celebrity; she belongs neither in the factory, nor in the salon, but functions best in the atelier, the workshop and the street, with apprentices and other artisans, making and trading things and knowledge. The artisan fashions neither the mass produced inventories of warehouses, nor the precious, unique objects that must only be seen in galleries, museums and auction houses. The objects and services that pass through her hands into the world are neither ubiquitous nor rare, nor do they seek value in ubiquity or rarity. They trade on the basis of their usage, within densely networked communities that the artisan is party to, not on the impetus of rival global speculations based on the volumes and volatility of stocks, or the price of a signature. As warehouses and auction houses proliferate, squeezing out the atelier and the workshop, the artisan loses her way. At the margins of an early industrial capitalism, the artisan seemingly transacts herself out of history, making way for the drone and the genius, for the polarities of drudgery and creativity, work and art.

## **II. Immaterial Labour**

Due to the emergence of a new economy of intellectual property based on the fruits of immaterial labour, the distinction between the roles of the worker and the artist in strictly functional terms is once again becoming difficult to sustain. To understand why this is so we need to take a cursory look at the new ways in which value is increasingly being produced in the world today.

The combination of widespread cybernetic processes, increased economies of scale, agile management practices that adjust production to demand, and inventory status reports in a dispersed global assembly line, has made the mere manufacture of things a truly global fact. Cars, shoes, clothes, and medicines, or any commodity for that matter, are produced by more or less the same processes, anywhere. The manufacture of components, the research and design process, the final assembly and the marketing infrastructure no longer need to be circumscribed within one factory, or even one nation state or regional economic entity. The networked nature of contemporary industrial production frees the finished good from a fidelity to any one location. This also results in a

corollary condition - a multiplication of renditions, or editions (both authorised as well as counterfeit) of any product line at a global scale. Often, originals and their imitations are made in the same out-sourced sweatshop. The more things multiply, the more they tend towards similarity, in form and appearance, if not in function.

Thus, when capital becomes more successful than ever before at fashioning the material surface of the world after its own image, it also has more need than ever before for a sense of variety, a classificatory engine that could help order the mass that it generates, so that things do not cancel each other out by their generative equivalence. Hence the more things become the same, the more need there is for distinguishing signs, to enable their purchase. The importance given to the notions of 'brand equity', from which we get derivatives like 'brand velocity', 'brand loyalty' and a host of other usages prefixed by the term 'brand', is indicative of this reality.

Today, the value of a good lies not only in what makes it a thing desirable enough to consume as a perishable capsule of (deferred) satisfaction. The value of a good lies especially in that aspect of it which makes it imperishable, eternally reproducible, and ubiquitously available. Information, which distils the imperishable, the reproducible, the ubiquitous in a condensed set of signs, is the true capital of this age. A commodity is no longer only an object that can be bought and sold; it is also that thing in it which can be read, interpreted and deciphered in such a way that every instance of decryption or encryption can also be bought and sold. Money lies in the meaning that lies hidden in a good. A good to eat must also be a good to think with, or to experiment with in a laboratory. This encryption of value, the codification and concentration of capital to its densest and most agile form, is what we understand to be intellectual property.

### **How valuable is intellectual property?**

How valuable is intellectual property? In attempting to find an answer to a question such as this, it is always instructive to look at the knowledge base that

capitalism produces to assess and understand itself. In a recent paper titled 'Evaluating IP Rights: In Search of Brand Value in the New Economy' a brand management consultant, Tony Samuel of PricewaterhouseCoopers' Intellectual Asset Management Group says:

'This change in the nature of competition and the dynamics of the new world economy have resulted in a change in the key value drivers for a company from tangible assets (such as plant and machinery) to intangible assets (such as brands, patents, copyright and know how). In particular, companies have taken advantage of more open trade opportunities by using the competitive advantage provided by brands and technology to access distant markets. This is reflected in the growth in the ratio of market-capitalised value to book value of listed companies. In the US, this ratio has increased from 1:1 to 5:1 over the last twenty years.

'In the UK, the ratio is similar, with less than 30% of the capitalised value of FTSE 350 companies appearing on the balance sheet. We would argue that the remaining 70% of unallocated value resides largely in intellectual property and certainly in intellectual assets. Noticeably, the sectors with the highest ratio of market capitalisation to book value are heavily reliant on copyright (such as the media sector), patents (such as technology and pharmaceutical) and brands (such as pharmaceutical, food and drink, media and financial services).'<sup>1</sup>

The paper goes on to quote Alan Shepard, sometime chairman of Grand Metropolitan plc, an international group specializing in branded food, drinks and retailing which merged with Guinness in 1997 to form Diageo, a corporation which today controls brands as diverse as Smirnoff and Burger King.

'Brands are the core of our business. We could, if we so wished, subcontract all of the production, distribution, sales and service functions and, provided that we retained ownership of our brands, we would continue to be successful and profitable. It is our brands that provide the profits of today and guarantee the profits of the future.'

We have considered brands here at some length, because of the way in which

brands populate our visual landscape. Were a born again landscape painter to try and represent a stretch of urban landscape, it would be advisable for him or her to have privileged access to a smart intellectual property lawyer. But what is true of brands is equally true of other forms of intangible assets, or intellectual property, ranging from music, to images to software.

The legal regime of intellectual property is in the process of encompassing as much as possible of all cultural transactions and production processes. All efforts to create or even understand art will have to come to terms, sooner or later, with the implications of this pervasive control, and intellectual property attorneys will no doubt exert considerable ‘curatorial’ influence as art events, museums and galleries clear artists projects, proposals and acquisitions as a matter of routine. These ‘attorney-curators’ will no doubt ensure that art institutions and events do not become liable for possible and potential ‘intellectual property violations’ that the artist, curator, theorist, writer or practitioner may or may not be aware of as being inscribed into their work.

### **III. The Worker as Artist**

What are the implications of this scenario? The worker of the twenty first century, who has to survive in a market that places the utmost value on the making of signs, finds that her tools, her labour, her skills are all to do with varying degrees of creative, interpretative and performative agency. She makes brands shine, she sculpts data, she mines meaning, she hews code. The real global factory is a network of neural processes, no less material than the blast furnaces and chimneys of manufacturing and industrial capitalism. The worker of the twenty first century is also a performer, a creator of value from meaning. She creates, researches and interprets, in the ordinary course of a working day to the order that would merit her being considered an artist or a researcher, if by ‘artist’ or ‘researcher’ we understand a person to be a figure who creates meaning or produces knowledge.

Nothing illustrates this better than the condition of workers in Information

technology enabled industries like Call Centre and Remote Data Outsourcing, which have paved the way for a new international matrix of labour, and given a sudden performative twist to the realities of what is called Globalisation. In a recent installation, called *A/S/L (Age/Sex/Location)*,<sup>2</sup> we looked at the performative dimension in the lives of call centre workers.

### **The Call Centre Worker and her world<sup>3</sup>**

A call centre worker in the suburb of Delhi, the city where we live, performs a Californian accent as she pursues a loan defaulter in a poor Los Angeles neighbourhood on the telephone. She threatens and cajoles him. She scares him, gets underneath his skin, because she is scared that he won't agree to pay, and that this will translate as a cut in her salary. Latitudes away from him, she has a window open on her computer telling her about the weather in his backyard, his credit history, his employment record, his prison record. Her skin is darker than his, but her voice is trained to be whiter on the phone. Her night is his day. She is a remote agent with a talent for impersonation in the IT enabled industry in India. She never gets paid extra for the long hours she puts in. He was laid off a few months ago, and hasn't been able to sort himself out. Which is why she is calling him for the company she works for. He lives in a third world neighbourhood in a first world city, she works in a free trade zone in a third world country. Neither knows the other as anything other than as 'case' and 'agent'. The conversation between them is a denial of their realities and an assertion of many identities, each with their truths, all at once.

Central to this kind of work is a process of imagining, understanding and invoking a world, mimesis, projection and verisimilitude as well as the skilful deployment of a combination of reality and representation. Elsewhere, we have written of the critical necessity of this artifice to work (in terms of creating an impression of proximity that elides the actuality of distance) in order for a networked global capitalism to sustain itself on an everyday basis, but here, what we would like to emphasise is the crucial role that a certain amount of 'imaginative' skill, and a combination of knowledge, command over language,

articulateness, technological dexterity and performativity plays in making this form of labour productive and efficient on a global scale.

#### **IV. Marginalia**

Sometimes, the most significant heuristic openings are hidden away on the margins of the contemporary world. While the meta-narratives of war, globalisation, disasters, pandemics and technological spectacles grab headlines, the world may be changing in significant but unrecognised directions at the margins, like an incipient glacier inching its way across a forsaken moraine. These realities may have to do with the simple facts of people being on the move, of the improvised mechanisms of survival that suddenly open out new possibilities, and the ways in which a few basic facts and conceptions to do with the everyday acts of coping with the world pass between continents.

Here, margin is not so much a fact of location (as in something peripheral to an assumed centre) as it is a figure denoting a specific kind or degree of attentiveness. In this sense, a figure may be located at the very core of the reality that we are talking about, and still be marginal, because it does not cross a certain low-visibility, low-attention threshold, or because it is seen as being residual to the primary processes of reality. The call centre worker may be at the heart of the present global economy, but she is barely visible as an actor or an agent. In this sense, to be marginal is not necessary to be ‘far from the action’ or to be ‘remote’ or in any way distant from the very hub of the world as we find it today.

The Margin has its own image-field. And it is to this image-field that we turn to excavate or improvise a few resources for practice.

A minor artisanal specialisation pertaining to medieval manuscript illumination was the drawing and inscription of what has been called ‘marginalia’ (Ottwell 1995). ‘Marginalists’ (generally apprentices to scribes) would inscribe figures, often illustrating profane wisdom, popular proverbs, burlesque figures and fantastical or allegorical allusions that occasionally constructed a counter-



narrative to the main body of the master text, while often acting as what was known as “exempla”: aids to conception and thought (and sometimes as inadvertent provocations for heretic meditations). It is here, in these marginal illuminations, that ordinary people - ploughmen, peasants, beggars, prostitutes and thieves would often make their appearances, constructing a parallel universe to that populated by kings, aristocrats, heroes, monsters, angels, prophets and divines. Much of our knowledge of what people looked like in the medieval world comes from the details that we find in manuscript marginalia. They index the real, even as they inscribe the nominally invisible. It would be interesting to think for instance of the incredible wealth of details of dress, attitude, social types and behaviours that we find in the paintings of Hieronymus Bosch, or Pierre Breughel as marginalia writ large. It is with some fidelity to this artisanal ideal of using marginalia as exemplars that we would like to offer a small gallery of contemporary marginal figures.

## **V. Five Figures to Consider**

As significant annotations to the text of present realities, and as ways out for the dilemmas that we have faced in our own apprehensions of the world, we find ourselves coming back repeatedly to them in our practice - as images, as datums and as figures of thought, as somewhat profane icons for meditation. We feel that these figures, each in their own way, speak to the predicament of the contemporary practitioner.

### **Figure One: The Alien Navigates a Boat at Sea**

A boat changes course at sea, dipping temporarily out of the radar of a nearby coast guard vessel. A cargo of contraband people in the hold, fleeing war, or the aftermath of war, or the fifth bad harvest in a row, or a dam that flooded their valley, or the absence of social security in the face of unemployment, or a government that suddenly took offence at the way they spelt their names - study the contours of an unknown coastline in their minds, experiment with the pronunciations of harbour names unfamiliar to their tongues. Their map of the world is contoured with safe havens and dangerous border posts, places for

landing, transit and refuge, anywhere and everywhere, encircled and annotated in blue ink. A geography lesson learnt in the International University of Exile.

**Figure Two: The Squatter builds a Tarpaulin Shelter**

Tarpaulin, rope, a few large plastic drums, crates, long poles of seasoned bamboo, and quick eyes and skilled hands, create a new home. A migrant claims a patch of fallow land, marked ‘property of the state’ in the city. Then comes the tough part: the search for papers, the guerrilla war with the Master Plan for a little bit of electricity, a little bit of water, a delay in the date of demolition, for a few scraps of legality, a few loose threads of citizenship. The learning of a new accent, the taking on of a new name, the invention of one or several new histories that might get one a ration card, or a postponed eviction notice. The squat grows incrementally, in Rio de Janeiro, in Delhi, in Baghdad, creating a shadow global republic of not-quite citizens, with not-yet passports, and not-there addresses.

**Figure Three: The Electronic Pirate burns a CD**

A fifteen square-yard shack in a working-class suburb of northeast Delhi is a hub of the global entertainment industry. Here, a few assembled computers, a knock-down Korean CD writer, and some Chinese pirated software in the hands of a few formerly unemployed, or unemployable young people turned media entrepreneurs, transform the latest Hollywood, or Bollywood blockbuster into the stuff that you can watch in a tea shop on your way to work. Here, the media meets its extended public. It dies a quick death as one high-end commodity form, and is resurrected as another. And then, like the Holy Spirit, does not charge an exorbitant fee to deliver a little grace unto those who seek its fleeting favours. Electronic piracy is the flow of energy between chained product and liberated pixel that makes for a new communion, a samizdat of the song and dance spectacular.

**Figure Four: The Hacker Network liberates Software**

A community of programmers dispersed across the globe sustains a growing body of software and knowledge - a digital commons that is not fenced in by

proprietary controls. A network of hackers, armed with nothing other than their phone lines, modems, internet accounts and personal computers inaugurate a quiet global insubordination by refusing to let code, music, texts, math and images be anything but freely available for download, transformation and distribution. The freedom is nurtured through the sharing of time, computing resources and knowledge in a way that works out to the advantage of those working to create the software, as well as to a larger public, that begins swapping music and sharing media files to an extent that makes large infotainment corporations look nervously at their balance sheets. The corporations throw their lawyers at the hackers, and the Intellectual Property Shock Troops are out on parade, but nothing can turn the steady erosion of the copyright.

### **Figure Five: Workers Protect Machines in an Occupied Factory**

Seamstresses at the Brukman Garment Factory in Buenos Aires shield their machines against a crowd of policemen intent on smashing them (Klein 2003). The power of the Argentine state provokes a perverse neo Luddite incident, in which the workers are attacked while they try to defend their machines from destruction. The Brukman Factory is a 'fabrica ocupada', a factory occupied by its workers, one of many that have sustained a new parallel social and economic structure based on self regulation and the free exchange of goods and services outside or tangential to the failed money economy - a regular feature of the way in which working people in Argentina cope with the ongoing economic crisis. Turning the rhetoric and tactics of working class protest on its head, the seamstresses of the Brukman factory fight not to withdraw their labour from the circuit of production, but to protect what they produce, and to defend their capacity to be producers, albeit outside the circuit desired by capital.

## **VI. Significant Transgressions**

These five transgressors, a pentacle of marginalia, can help us to think about what the practitioner might need to understand if she wants to recuperate a sense of agency. In very simple terms, she would need to take a lesson in breaking borders and moving on from the migrant, in standing her ground

and staying located from the squatter, in placing herself as a link in an agile network of reproduction, distribution and exchange from the pirate, in sharing knowledge and enlarging a commons of ideas from the hacker, and in continuing to be autonomously productive from the workers occupying the factory.

The first imperative, that of crossing borders, translates as scepticism of the rhetoric of bounded identities, and relates to the role of the practitioner as a 'journeyman', as the peripatetic who maps an alternative world by her journey through it. The second, of building a shelter against the odds of the law, insists however on a practice that is located in space, and rooted in experience, that houses itself in a concrete 'somewhere' on its own terms, not of the powers that govern spaces. It is this fragile insistence on provisional stability, which allows for journeys to be made to and from destinations, and for the mapping of routes with resting places in between. The third imperative, that of creating a fertile network of reproduction of cultural materials, is a recognition of the strength of ubiquity, or spreading ideas and information like a virus through a system. The fourth imperative, of insisting on the freedom of knowledge from proprietary control, is a statement about the purpose of production - to ensure greater pleasure and understanding without creating divisions based on property, and is tied in to the fifth imperative - a commitment to keep producing with autonomy and dignity.

Taken together, these five exempla constitute an ethic of radical alterity to prevailing norms without being burdened by the rhetorical overload that a term like 'resistance' invariably seems to carry. They also map a different reality of 'globalisation' - not the incessant, rapacious, expansion of capitalism, but the equally incessant imperative that makes people move across the lines that they are supposed to be circumscribed by, and enact the everyday acts of insubordination that have become necessary for their survival. It is important to look at this subaltern globalisation from below, which is taking place everywhere, and which is perhaps far less understood than the age-old expansionist drive of capitalism, which is what the term 'globalisation' is now generally used to refer

to. It embodies different wills to globality and a plethora of global imaginaries that are often at cross-purposes with the dominant rhetoric of corporate globalisation.

The illegal emigrant, the urban encroacher, electronic pirate, the hacker and the seamstresses of the Brukman Factory of Buenos Aires are not really the most glamorous images of embodied resistance. They act, if anything, out of a calculus of survival and self-interest that has little to do with a desire to 'resist' or transform the world. And yet, in their own way, they unsettle, undermine and destabilize the established structures of borders and boundaries, metropolitan master plans and the apparatus of intellectual property relations and a mechanism of production that robs the producer of agency. If we examine the architecture of the contemporary moment, and the figures that we have described, it does not take long to see five giant, important pillars: the consolidation, redrawing and protection of boundaries; the grand projects of urban planning and renewal; and the desire to protect information as the last great resource left for capitalism to mine - which is what Intellectual Property is all about; control over the production of knowledge and culture; and the denial of agency to the producer.

Illegal emigration, urban encroachment, the assault on intellectual property regimes by any means, hacking and the occupation of sites of production by producers, each of which involve the accumulation of the acts of millions of people across the world on a daily, unorganised and voluntary basis, often at great risk to themselves, are the underbelly of this present reality.

But how might we begin to consider and understand the global figures of the alien, the encroacher, the pirate, the hacker and the worker defending her machine?

## **VII. Capital and its Residue**

The first thing to consider is the fact that most of these acts of transgression are inscribed into the very heart of established structures by people located at the

extreme margins. The marginality of some of these figures is a function of their status as the 'residue' of the global capitalist juggernaut. By 'residue', we mean those elements of the world that are engulfed by the processes of Capital, turned into 'waste' or 'leftovers', left behind, even thrown away.

Capital transforms older forms of labour and ways of life into those that are either useful for it at present, or those that have no function and so must be made redundant. Thus you have the paradox of a new factory, which instead of creating new jobs often renders the people who live around 'unemployable'; A new dam, that instead of providing irrigation, renders a million displaced, a new highway that destroys common paths, making movement more, not less difficult for the people and the communities it cuts through. On the other hand sometimes, like a sportsman with an injury who no longer has a place on the team, a factory that closes down ensures that the place it was located in ceases to be a destination. And so, the workers have to ensure that it stays open and working, in order for them to have a place under the sun.

What happens to the people in the places that fall off the map? Where do they go? They are forced, of course, to go in search of the map that has abandoned them. But when they leave everything behind and venture into a new life they do not do so entirely alone. They go with the networked histories of other voyages and transgressions, and are able at any point to deploy the insistent, ubiquitous insider knowledge of today's networked world.

### **Seepage in the Network**

How does this network act, and how does it make itself known in our consciousness? We like to think about this in terms of Seepage. By seepage, we mean the action of many currents of fluid material leaching on to a stable structure, entering and spreading through it by way of pores. Until, it becomes a part of the structure, both in terms of its surface, and at the same time continues to act on its core, to gradually disaggregate its solidity. To crumble it over time with moisture.

In a wider sense, seepage can be conceived as those acts that ooze through the pores of the outer surfaces of structures into available pores within the structure, and result in a weakening of the structure itself. Initially the process is invisible, and then it slowly starts causing mould and settles into a disfiguration - and this produces an anxiety about the strength and durability of the structure.

By itself seepage is not an alternative form; it even needs the structure to become what it is - but it creates new conditions in which structures become fragile and are rendered difficult to sustain. It enables the play of an alternative imagination, and so we begin seeing faces and patterns on the wall that change as the seepage ebbs and flows.

In a networked world, there are many acts of seepage, some of which we have already described. They destabilise the structure, without making any claims. So the encroacher redefines the city, even as she needs the city to survive. The trespasser alters the border by crossing it, rendering it meaningless and yet making it present everywhere - even in the heart of the capital city - so that every citizen becomes a suspect alien and the compact of citizenship that sustains the state is quietly eroded. The pirate renders impossible the difference between the authorised and the unauthorised copy, spreading information and culture, and devaluing intellectual property at the same time. Seepage complicates the norm by inducing invisible structural changes that accumulate over time.

It is crucial to the concept of seepage that individual acts of insubordination are not uprooted from the original experience. They have to remain embedded in the wider context to make any sense. And this wider context is a networked context, a context in which incessant movement between nodes is critical.

### **VIII. A Problem for the History of the Network**

But how is this network's history to be understood? To a large measure, this is made difficult by the fact of an 'asymmetry of ignorance' about the world. We are all ignorant of the world in different ways and to different degrees. And that

is one of the reasons why the 'Network' often shades off into darkness, at some or other point. This is what leads to global networks that nevertheless ignore the realities of large parts of the world, because no one has the means to speak of those parts, and no one knows whether people exist in those parts that can even speak to the world in the language of the network. Thus the language of the network often remains at best only a mobile local dialect.

A media practitioner or cultural worker from India, for example, is in all likelihood more knowledgeable about the history of Europe than could be the case for the European vis-a-vis India. This is a fact engendered by colonialism that has left some societies impoverished in all but an apprehension of reality that is necessarily global. The historian Dipesh Chakrabarty has reminded us, 'Insofar as the academic discourse of history is concerned, "Europe" remains the sovereign, theoretical subject of all histories, including the ones we call "Indian", "Chinese", "Kenyan", and so on. There is a peculiar way in which all these other histories tend to become variations on a master narrative that could be called "the history of Europe".' (1992)

But this very same fact, when looked at from a European standpoint, may lead to a myopia, an inability to see anything other than the representational master narrative of European history moulding the world. The rest of the world is thus often a copy seeking to approximate this original.

All this to say: not merely that we have incomplete perspectives, but that this asymmetry induces an inability to see the face in the wall, the interesting pattern, produced by the seepage. We may inhabit the anxiety, even be the source and locus of the destabilisation and recognise the disfiguration, but the envisioning of possible alternative imaginaries may still continue to elude us.

## **IX. Towards an Enactive Model of Practice**

Recently in a book on neuropolitics, we came across an experiment which is now considered classic in studies of perception (The Held and Heims Experiment),



which might give us an interesting direction to follow now (Connolly 2002).

Two litters of kittens are raised in the dark for some time and then exposed to light under two different sets of conditions. The first group is allowed to move around in the visual field and interact with it as kittens do - smelling things, touching them, trying out what can be climbed and where the best places to sleep are. The kittens in the second group (though they are placed in the same environment) are carried around in baskets rather than allowed to explore the space themselves, and thus are unable to interact with it with all their senses and of their own volition.

The two groups of kittens develop in very different ways. When the animals are released after a few weeks of this treatment, the first group of kittens behaves normally, but those who have been carried around behave as if they were blind; they bump into objects and fell over edges. It is clear that the first group's freedom to experience the environment in a holistic way is fundamental to its ability to perceive it at all. What is the significance of this? Within neuroscience, such experiments have served to draw neuroscientists and cognitive scientists away from representational models of mind towards an 'enactive' model of perception in which objects are not perceived simply as visual abstractions but rather through an experiential process in which information received from this one sense is 'networked' with that from every other. Vision, in other words, is deeply embedded in the processes of life, and it is crucial to our ability to see that we offset the representations that we process, with the results of the experiences that we enter into. We need to know what happens when we take a step, bump into someone, be startled by a loud noise, come across a stranger, an angry or a friendly face, a gun or a jar of milk.

In a sense this implies a three-stage encounter that we are ascribing between the practitioner and her world. First, a recognition of the fact that instances of art practices can be seen as contiguous to a 'neighbourhood' of marginal practices embodied by the figures of the five transgressors. Secondly, that 'seeing' oneself

as a practitioner, and understanding the latent potentialities of one's practice, might also involve listening to the ways in which each of the five transgressive figures encounters the world. Finally, that what one gleans from each instance of transgression can then be integrated into a practice which constitutes itself as an ensemble of attitudes, ways of thinking, doing and embodying (or recuperating) creative agency in a networked world.

For us here, this helps in thinking about the importance of recognising the particularity of each encounter that the practitioner witnesses or enters into, without losing sight of the extended network, of the 'neighbourhood' of practices.

It is only when we see particularities that we are also able to see how two or more particular instances connect to each other. As residues, that search for meaning occurs in other residual experiences; or as acts of seepage, in which the flow of materials from one pore to another ends up connecting two nodes in the network, by sheer force of gravity. Here it is the gradients of the flow, the surface tension that the flow encounters and the distance that the flow traverses, that become important, not the intention to flow itself. Intentions, resistances, may be imputed, but in the end they have little to do with the actual movements that transpire within the network.

## **X. Art practice and protocols of networked conversation**

What does art and artistic practice have to do with all this? What can the practitioner take from an understanding of interactive embeddedness in a networked world? We would argue that the diverse practices that now inhabit art spaces need to be able to recognise the patterns in the seepage, to see connections between different aspects of a networked reality.

To do this, the practitioner probably has to invent, or discover, protocols of conversation across sites, across different histories of locatedness in the network; to invent protocols of resource building and sharing, create structures

within structures and networks within networks. Mechanisms of flexible agreements about how different instances of enactment can share a contiguous semantic space will have to be arrived at. And as we discover these 'protocols', their different ethical, affective and cognitive resonances will immediately enter the equation. We can then also begin to think of art practice as enactment, as process, as elements in an interaction or conversation within a network.

For the acts of seepage to connect to form new patterns, many new conversations will have to be opened, and mobile dialects will have to rub shoulders with each other to create new, networked Creoles. Perhaps art practice in a networked reality can itself aspire to create the disfigurements on the wall, to induce some anxieties in the structure, even while making possible the reading of the face in the spreading stain, the serendipitous discovery of an interesting pattern or cluster of patterns, and possible alterities.



This text draws from a presentation by Monica Narula (Raqs Media Collective) at 'Globalica: Conceptual and Artistic Tensions in the New World Disorder' symposium (WRO biennale, Wroclaw, Poland, 2003). It is also published in Marina Vishmidt & Melanie Gilligan (eds.) (2004) 'Immaterial Labour: Work, Research & Art', London/New York: Black Dog.

**NOTES:**

1. Tony Samuel, PricewaterhouseCoopers' Intellectual Asset Management Group, 'Evaluating IP Rights: In Search of Brand Value in the New Economy' <<http://www.pwcglobal.com/Extweb/service.nsf/docid/210123EF9AEBAC1885256B96003428C6>>.

2. A/S/L: A video, text and sound installation by Raqs Media Collective that juxtaposes the protocols of interpersonal communication, online labour, data outsourcing, and the making/unmaking of remote agency in the 'new' economy. Presented at the Geography and the Politics of Mobility exhibition, curated by Ursula Biemann for the Generali Foundation, Vienna, Jan-April 2003 <<http://www.absolutearts.com/artsnews/2003/01/17/30667.html>> & <[http://foundation.generali.at/exhibit/2003\\_1\\_geo\\_indexe.htm](http://foundation.generali.at/exhibit/2003_1_geo_indexe.htm)>.

3. See Raqs Media Collective's 'Call Centre Calling: Technology, Network and Location' (2003); for more on the call centre industry in India, see Mark Landler's 'Hi I'm in Bangalore (But I Dare Not Tell)' (2001), and 'India Calling - A Report on the Call Centre Industry in India' <<http://www.researchandmarkets.com/reports/2387/>>.

**REFERENCES:**

Dipesh Chakravarty (1992) 'Postcoloniality and the Artifice of History: Who Speaks for "Indian" Pasts', Representations, 37 (Winter).

William E. Connolly (2002) 'Neuropolitics: Thinking, Culture, Speed', Theory Out of Bounds, Number 23, University of Minnesota.

Naomi Klein (2003) 'Argentina's Luddite Rulers: Workers in the Occupied Factories Have a Different Vision: Smash the Logic, Not the Machines', Dissident Voice, April 25 <[http://www.dissidentvoice.org/Articles/4/Klein\\_Argentina.htm](http://www.dissidentvoice.org/Articles/4/Klein_Argentina.htm)>.

Mark Landler (2001) 'Hi I'm in Bangalore (But I Dare Not Tell)', New York Times (Technology Section), March 21 <<http://www.nytimes.com/2001/03/21/technology/21CALL.html?ex=1054353600&en=7576033f99208ca6&ei=5070>>.

Andrew Otwell (1995) 'Medieval Manuscript Marginalia and Proverbs' <<http://www.heyotwell.com/work/arthistory/marginalia.html>>.

Raqs Media Collective (2003) 'Call Centre Calling: Technology, Network and Location', in Sarai Reader 03: Shaping Technologies <[http://www.sarai.net/journal/03pdf/177\\_183\\_raqsmediac.pdf](http://www.sarai.net/journal/03pdf/177_183_raqsmediac.pdf)>.

### **The Institute for Applied Autonomy**

The Institute for Applied Autonomy was founded in 1998 as an anonymous collective of engineers, designers, artists and activists who are united by the cause of individual and collective self-determination. The group's stated mission is to develop technologies that extend the autonomy of human activists in the performance of real-world, public acts of expression. The diminishing accessibility of public spaces for free expression and the increased omni-presence of electronic surveillance has been a key motivation for IAA research. The results have included an ultra-cute robot designed for targeted distribution of subversive literature and a small tele-operated robot designed for high-speed graffiti deployment from a remote location. The project called i-See is a web-based navigation service that allows users to avoid surveillance altogether by providing them with the path of least surveillance to their destination. Current research is focused on expanding the i-See software to serve as an open-source web-based map server and data collection tool. <<http://www.appliedautonomy.com/>>

### **Josephine Berry Slater**

Josephine Berry Slater is editor of Mute magazine, collaborator on the self-institutional theory resource <<http://www.ourorganisation.org/>> and completed her PhD on Site Specific Art on the Net at Manchester University in 2001. Her PhD can be found in the Mfiles section of <<http://www.metamute.com/>>. Her current research interests include women and reproductive labour within capitalism.

### **William Bowles**

William Bowles first 'stumbled' over computers during his art school days in the 1960s but his involvement with them as powerful tools of communication started in 1979 in New York. He immediately realised that they were truly two-edged swords that could either assist in our liberation or assist in our enslavement. In 1984, he pioneered the use of Bulletin Board Systems to network independent news and then in 1985 took part in the creation of one of the first non-corporate global electronic publishing ventures, SouthScan, a weekly bulletin of news on Southern Africa. This was followed by another first in integrating electronic news with radio broadcasting at WBAI-FM in New York. In 1988, he began over a decade of involvement with the use of electronic communications and the liberation movement in South Africa, Namibia and El Salvador, culminating in his directing the development of the Election Information Unit for the African National Congress's 1994 election campaign, followed by the creation of Africa's first digital multi-media centre for the democratic movement based in COSATU. Since then, he has developed products for the publishing industry, lectured in online publishing for journalists, written two novels and three documentary film scripts for South African television. He currently publishes and writes for a current affairs

Website, Investigating 'new' Imperialism, as well as consulting and developing business plans and project management for the 'cultural production' industry.

## Bureau of Inverse Technology

The Bureau was formed in Melbourne Australia in 1991 by engineer/theorist Natalie Jeremijenko and radio journalist Kate Rich, with artist Daniela Tigani; and incorporated in the Cayman Islands in 1992. It was originally constructed as an anonymous group, a kind of guerilla technical intervention into some of the emergent techniques and technologies of the Information Age. BIT works with Information Technology as its primary material, re-engineering technical systems to address the hidden politics of technology. The anonymity of the Bureau was in part a strategy to reflect on the anonymity of technical production - the diffused accountability and ethnographic anonymity in which information technologies and software are generally produced.

<<http://www.bureauit.org>>

## Geoff Cox

Geoff Cox is an artist, teacher and projects organiser, as well as currently Lecturer in Computing at the University of Plymouth, UK, where he is part of i-DAT (Institute of Digital Art & Technology). He has a research interest in 'software art' <<http://www.anti-thesis.net/>> expressed in various critical writings and projects. With Adrian Ward and Stuart Brisley, he is a trustee of the UK Museum of Ordure <<http://www.museum-ordure.org.uk>>.

## Nick Dyer-Witthford

Nick Dyer-Witthford is an Associate Professor in the Faculty of Information and Media Studies at the University of Western Ontario, Canada. He is author of *Cyber-Marx: Cycles of Struggle in High Technology Capitalism* (Urbana: University of Illinois), and co-author of *Digital Play: The Interaction of Culture, Technology and Markets* (McGill-Queens University Press, 2003).

## etoy.CORPORATION

The etoy.CORPORATION is a corporate sculpture officially incorporated in 1994 in Zurich. etoy is a typical early mover (online since 1994) and developed rapidly into a controversial market leader in the field of experimental internet entertainment and art. etoy have won several international art awards (i.e. the golden nica in the .net category, prix ars electronica) and regularly appears on TV (invited and uninvited) as well as in other traditional media channels to inject the etoy.VIRUS: the new york times, silicon alley reporter, washington post, wired news, npr, le monde, der spiegel, nzz, woz, la rebubblica, relax japan, etc. etoy.CREW-MEMBERS have lectured and spoken at the MIT media lab in Boston, UCSD in San Diego, MOCA and CalArts in Los Angeles, DASARTS in Amsterdam, ETH Zurich, Gottlieb Duttweiler institute, Intercommunication Center ICC in Tokyo, the interactive institute in Stockholm and at many international festivals.

etoy.DISCLAIMER: etoy.INVESTMENTS are not focused on financial profits. The etoy.VENTURE is about cultural revenue, social profit and intellectual capital generated with the invested resources. All 2005 operations of etoy.CORPORATION are based on strategic alliances with Celebration-Hotels, Lista, EUnet, TEC-IT, La Clastra, Sitemapping, Pro Helvetia, and the labour and money of over 2000 individuals (etoy.SHAREHOLDERS and etoy.AGENTS in Europe, the US and Asia).

<<http://www.etoy.com/>>

## Matthew Fuller

Matthew Fuller has been involved in groups including I/O/D <<http://bak.spc.org/iod/>> and Mongrel <<http://www.mongrelx.org/>>. He is currently Reader in Media Design at the Piet Zwart Institute, Rotterdam <<http://pzwart.wdka.hro.nl/>> and is the author of various books, including *Behind the Blip: Essays on the Culture of Software* (Autonomedia, 2003), and *Media Ecologies: Materialist Energies in Art and Technoculture* (MIT Press, 2005).

## George Grinsted

George Grinsted is currently researching the impact of Free/Open Source Software communities on wider culture through the promotion of Copyleft and collaborative production models. Since leaving limbomedia ltd. in 2004, he has been working freelance on a range of projects including pindices.org, a collaboration with Lucy Kimmell that aims to visualise personal political or citizenship activity. Previous endeavours include lecturing on the University of Plymouth's MediaLab Arts BSc (Hons) course, working extensively with the Institute of Digital Art and Technology (i-DAT) and producing projects such as BlogRadio, GeekClock and HelpLinux.

<<http://www.imgeorge.org/>>

## Harwood

Harwood is best known for his collaborative work Rehearsal of Memory (1995) produced with maximum security mental patients (permanent Collection Centre Pompidou et du Musée National d'Art Moderne) and as a core part of the Mongrel group <<http://www.mongrelx.org/>> which has won numerous awards, including the Imaginaria award and the Clarks Digital Bursary (ICA, London). Mongrel is best known for National Heritage and Natural Selection, which explored racialisation and the new eugenics. It is closely associated with the formation of social software and software art through its development of Linker and HeritageGold, BlackLash. Harwood received the first online commission from Tate Gallery London's Uncomfortable Proximity (for which he won the Leonardo New Horizons Award for Innovation in New Media). Harwood spent the last few years working in the Netherlands with the Waag Society and Imagine IC constructing Nine(9), a collaborative engine for celebrating the lives of those locked out of the cultural mainstream.

<<http://www.scotoma.org/>>

## Jaromil

Jaromil the Rasta Coder (RASTASOFT.org) is an Italian GNU/Linux programmer, author and maintainer of three free software programs and an operating system: MuSE (for running a web radio), FreeJ (for veejay and realtime video manipulation), HasciiCam (ascii video streaming) and dyne:bolic (the bootable CD running directly without requiring installation, a popular swiss army knife in the fields of production and broadcasting of information). All his creations are freely available online under the GNU General Public License (Free Software Foundation). His work has featured in CODEDOC II (Whitney Museum Artport), Read\_Me 2.3 (runme.org), negotiations 2003 (Toronto CA), I LOVE YOU (MAK Frankfurt), Rhizome, POes1s digitale poesie (Berlin). Wired to the matrix since 1991 (BBS point on CyberNet 65:1500/3.13), in 1994 he co-founded the non-profit organisation Metro Olografix for the diffusion of telematic cultures, and in 2000 opened the software atelier dyne.org. He is currently a member of the FreakNet, sub-root for autistici/inventati.org, active with italy indymedia, Radio Onda Rossa (Roma 87.9FM), Streamtime and ASCII.

<<http://www.rastasoft.org/>>

## Joasia Krysa

Joasia Krysa is a curator, researcher at i-DAT (Institute of Digital Art and Technology), and currently a lecturer in the School of Computing, Communication and Electronics, University of Plymouth, UK. She is co-editor of the DATA browser series (with Autonomedia), curator of 'kurator.org' projects (<http://www.kurator.org>) and collaboratively runs 'thecuratorial.network' (<<http://www.curatorial.net>>). She has organised a number of conferences including (with Geoff Cox) 'globalica: artistic and conceptual tensions in the new world disorder' as part of the WRO biennial 03 (Poland), and 'artist as engineer', as part of an Arts Council of England initiative around socially-engaged arts practice, at i-DAT (UK). Recently she guest-edited issue 2 of EJHAE journal on 'Economies of Knowledge' <<http://www.ejhae.elia-artschools.org/Issue2/en.htm>>.

## Armin Medosch

Armin Medosch is a London based writer, artist and curator. From 1996 to 2002, he was co-editor of Telepolis, the award-winning 'magazine of net-culture'. His latest book is *Freie Netze - Free Networks*, published in German (Heise Verlag, 2003), about the politics, history and culture of wireless community networks. He has contributed articles and essays to many books, catalogues, magazines and newspapers - one of his latest pieces being 'Not Just Another Wireless Utopia' for *The Future Of Computer Arts*, edited by Marina Grzinic (MKC, Maribor and Maska, Ljubljana). Medosch has recently contributed to DMZ Media Arts Festival, London; Wizards of OS3, Berlin; Futuresonica, Manchester; Transmediale 04, Berlin; Crosstalks, Brussels; Basics, Salzburg; and RAM5, Riga. He is a member of the University of Openness <<http://twentiethcentury.com/uo/>>, and teaches as associate senior lecturer at Ravensbourne College's postgraduate MA courses 'Networked Media Environments' and 'Interactive Digital Media'.

## Raqs Media Collective

Raqs Media Collective (Jeebesh Bagchi, Monica Narula & Shuddhabrata Sengupta) is a group of media practitioners working in new media, installations, video, sound, photography and text. The collective is based in Delhi. Together with Ravi Sundaram and Ravi Vasudevan, Raqs co-founded Sarai <<http://www.sarai.net>> at the Centre for the Study of Developing Societies, Delhi. Raqs has exhibited installation, print and other media projects at, amongst others, the 50th Venice Biennale; Documenta11, Kassel; Palais de Beaux Arts, Brussels; Emocao Artificial, Sao Paulo; Generali Foundation Gallery, Vienna; Ars Electronica, Linz; the Walker Art Center, Minneapolis; and the Roomade Office for Contemporary Art, Brussels. Their most recent projects include *Considering Residue: Table Maps* for Liverpool, Liverpool Biennial; and *The Impostor in the Waiting Room*, Bose/Pacia Modern, New York.

<<http://www.raqsmediacollective.net/>>

## Redundant Technology Initiative

Redundant Technology Initiative was set up in 1996 by James Wallbank. He started working with trash technology in the early 1990s in response to a digital arts scene hypnotised by the latest gadgets and the fact that, as an unknown artist, he was completely broke. Redundant Technology Initiative has exhibited across Europe, in venues as diverse as a cybersquat and an underground fortress, as well as in prestigious galleries like Tate Britain and Germany's ZKM. As well as exhibiting, the group recycles hundreds of computers per year, and since 2000 run an open access digital media lab, Access Space, the UK's first free media lab built from donated trash.

<<http://www.lowtech.org/>>

## Pit Schultz

Pit Schultz is a self-attested 'power user' and compulsive computer magazine reader. At the moment, calls himself a 'social media architect'. A longtime media practitioner, Schultz has initiated numerous critical art and technology projects and is a founder of the nettime mailing list. He lives in Berlin where he co-runs bootlab, an independent media production space, which hosted the free cultural radio station reboot.fm.

<<http://www.bootlab.org/>>



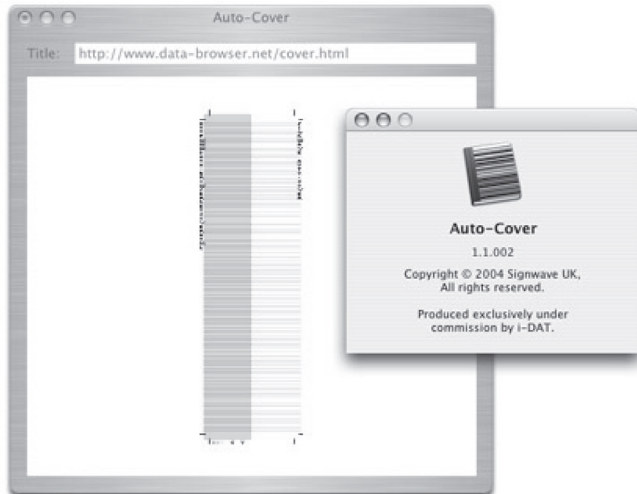




# DATA browser



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