INFORMATION CULTURES AND COUNTER-CULTURES

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Abstract: The Arts and Sciences have always been considered distinct, but have played differing roles with respect to significant ethical, humanitarian and political issues of the day. Computers were first introduced within a culture of data processing, which gave rise to a number of social issues. As computers developed, the concept of 'information' became more important, yet it is very difficult to say what is meant by that term. Despite this, the concept of 'information' has been instrumental in promoting free-market economics. However, the introduction of mixed media computing raises some serious questions about the adequacy of the concept of 'information' and suggests that the current mainstream ideology of computing is under some pressure. People who worked in computing in the early decades frequently held libertarian views that were often described as counter-cultural. Many of these views were absorbed within the dominant culture of free-market liberalisation, but different counter-cultures have emerged (e.g., hackers and political activists). Some digital artists and designers can also be considered counter-cultural and it is from this direction that we might see an emerging positive ethical response to contemporary issues.

Data, data, everywhere and not a thought to think.
Jesse Shera

1. INTRODUCTION: ARTS AND SCIENCES

The Royal Albert Hall in London is nowadays used almost entirely for entertainment purposes but when it was erected over one hundred years ago it was, according to the engraving upon its outside,

> ...erected for the advancement of the Arts and Sciences, and works of industry of all nations...

In the true spirit of the late nineteenth century, differences between the Arts and Sciences were acknowledged, but also their cooperation was considered a matter for practical action. When the Hall opened in 1871 it soon became a venue for events as diverse as demonstrations of Morse Code and electric lighting, exhibitions of bicycles and motor cars, music concerts and readings of poetry. One hundred years ago, the bringing together of the Arts and Sciences was a significant practical project.

Nearly ninety years later, in 1959, the novelist C. P. Snow delivered a famous lecture in Cambridge entitled 'The Two Cultures' in which he also talked about the Arts and Sciences —in Snow's terminology, *intellectuals* and *scientists,* or more precisely *literary intellectuals* and *physical scientists* (Snow, 1964). Snow claimed that the two groups had "...almost ceased to communicate at all, [and] in intellectual, moral and psychological climate had so little in common...". It appears that in those 90 years the Arts and Sciences, rather than coming closer together, had drifted further apart.

Snow's lecture received plenty of publicity that at time, and has continued to receive considerable attention right up to today. For example, a recent search for "Two Cultures" on Google (25/1/05) yielded 39,400 hits: to put this in perspective, Stephen Hawking's "A Brief History of Time" yielded 72,600 hits and Francois Lyotard's "Postmodern Condition" yielded 25,800 hits.

From the standpoint of the early 1960s, Snow was projecting a strong modernist belief that (in the words of Harold Wilson, a future Prime Minister of the UK) "the white heat of the technological revolution" was the only progressive response to the unimaginative conservatism that had been in power, certainly in Britain, for over a decade.

Moving forward another 20 years to the 1970s we find that such popular optimism for science and technology had all but evaporated and science was frequently perceived as too large and dangerous. The development of nuclear weapons, the unreliability of nuclear power, the over-use of pesticides, fertilisers and other chemicals, the misuse of drugs and medicines, the depletion of natural resources – these had done much to deflate the idea that unbridled science will inevitably lead to global happiness. They brought about a refocusing on questions of what kind of science was needed, what limitations should placed upon it, and how its benefits should be distributed.

The response of many scientists was to retreat into a claimed 'neutrality of science' which was then posed as the opposite of 'ideology'. In 1973, Daniel Bell (the author of 'The End of Ideology' (1960)) described the scientific community as universal and disinterested with "no set of postulated formal beliefs" (Bell 1973). But in the eyes of many young people the traditional physical sciences started to decline in popularity (though this was not the case in newer, non-material sciences such as computer science and psychology). By contrast to the 'neutral' stance adopted by physical scientists, it was social scientists and literary intellectuals who increasingly expressed political commitment to working class and Third World issues and were significant among the supporters of the left. Many novelists, dramatists and poets, (not to forget also artists, actors and musicians, who were omitted from Snow's analysis) were prominent in left-of-centre political campaigns. Left-leaning governments have generally enjoyed (and usually still enjoy) the support of the artistic communities and are seen as being good for creativity. So, within another 20 years, while the gap that Snow alerted us to still existed, the roles played by the respective parties had almost completely reversed.

2. THE CULTURE OF INFORMATION

2.1 Two Early Cultures of Computing

Snow would have been only vaguely aware in 1959 of the future exponential growth of the computer (though, no doubt, he would have approved). At that time, the evolving nature of computing was still in the balance with two opposing cultures ranged against each other. As Stephen Heims (1980) has documented, there was real ideological conflict in the early days about the deep relationship of computers to their societal context. The ideology of cybernetics, as championed by Norbert Wiener, saw the computer as one element of a larger and more holistic system in which it would play a useful regulatory role. Against this was the more formalized model of computing proposed by John von Neumann in which, working within a strict positivist philosophy, the computer plays a more abstract, functional role, and within which it is largely insulated from the wider consequences of its use.

Von Neumann's view received overwhelming political and economic support at that time, and, probably as a result, the type of computing that developed engendered an aura of mistrust. Newspapers described early

computers as 'Giant Brains'. A famous protester in the 1960s carried a placard reading: "I am a human being: do not bend, fold, staple or mutilate". IBM became synonymous with conformity of the worst kind. The computer became a symbol of unemployment, deskilling, the sexual division of labour, lack of privacy and bureaucracy. Computer ethics emerged as a humanist response to the concept of the computer as a machine for anonymous, large-scale processing of data. It was the 'data processing' model that became the first ideological face of the computer for most people.

The concept of 'Data Processing' represented a major epistemological realignment whereby the social language of computing was moulded to the form of logical positivism. This system of thought held out the hope that systems of symbols might reflect the totality of the world and, therefore, that processing such symbols might yield legitimate knowledge and enable us to exercise legitimate control over the real world, either with or without human intervention (Toulmin, 1991). From it flowed a number of socio-economic developments, from the routinization of office work through to more speculative projects such as artificial intelligence.

The computer's emergence as a data processing machine involved a new language promulgated to make legitimate activities such as corporate and bureaucratic computing. From the late 1960s through to the 1980s numerous textbooks were published that sought to explain data and information processing, all in strictly positivist terms (e.g. Arnold, 1978; Davis, 1969; Frates & Moldrup, 1983; Gore, 1979; Verzello, 1982). These books told us that data processing is about the transformation of *data* into *information* and that the key difference between the two is that information has a *meaning* or *purpose*. This, of course, implies that the generation of meaning is a process that is universal, does not rely on people and does not relate to the context of use.

2.2 Problems with 'Information'

Philosophically, this distinction between 'data' and 'information' is very unclear. Armand Mattelart (2003) refers to "the fuzziness of the notion of information" and I have argued that such attempts to define this distinction do not stand up to analysis (Beardon, 1994).

'Data' is a noun and does not have a verbal form; whereas the noun 'information' is derived from the verb 'to inform'. According to the Oxford English Dictionary (www.dictionary.oed.com):

To inform

> ... To impart knowledge of some particular fact or occurrence to (a person); to tell (one) of or acquaint (one) with something; to apprise. (OED)

This is a human social action—someone informs someone else of something—and is the root from which all other transformations seem to have been made. It should be noted that any instance of the verb 'to inform' requires an agent who does the informing, a particular fact that is being told, and a person or persons who are the recipients. There are no real problems with our use of this verb.

Our ability to create new words by transformation of existing words has led to many philosophical-linguistic problems. Initially, the transformed word "information' was harmless,

Information

> ... Knowledge communicated concerning some particular fact, subject, or event; that of which one is apprised or told; intelligence, news. (OED)

That is to say, it refers to the 'something' that is communicated in any particular act of informing. Had it stayed at this there would still be no real problem as it remained rooted in actual social events but, from the 1940s, an alternative way of thinking about information was promoted as the Mathematical Theory of Information (Shannon and Weaver, 1949). This notion defines information as,

> ... a mathematically defined quantity ...; now especially one which represents the degree of choice exercised in the selection or formation of one particular symbol, sequence, message, etc., out of a number of possible ones. (OED)

This sense of 'information' introduces a new idea: information that can exist without there being any act of informing; thus the context, content and purpose of the communication is all put to one side and we are invited to concentrate only on the formal and functional aspects of communication.

Of course, there is nothing wrong with introducing a new sense of a word for a specific purpose but problems can occur when specialist senses get confused with traditional senses.

Charlie Gere is clear that this has happened with the mathematical concept of information:

> ...it is from Shannon's concept of information that we owe the idea of information technology and by extension the information society it helped to bring about. (Gere 2002 50)

This did not happen without opposition, and we can observe another clash of cultures within computing over this issue. The economist, Fritz Machlup, refused to assign any special status to the new notion of 'information' and he argued that 'information' and 'data' are in most practical respects complete equivalents; further, they form no natural hierarchy or sequence and can, in most cases, be used interchangeability (Machlup 1983). To attempt to build a science upon their separation (i.e. 'Information Science') was, in his view, bogus and ill-informed.

Despite his formidable reputation, Machlup's satisfaction with the traditional concept of 'information' was politically unacceptable. First the US Government, and then the OECD, preferred a concept of information based upon the idea of 'quantities of data that are organized and communicated' (Porat, 1977). Thus, the mathematical notion of information was allowed to dominate in social and political policy discussions and issues of the content and context of information were made secondary. In this debate over the future of computing and society we were led to pay less attention to the social use (or 'use-value') of information and more attention to the value to be extracted from its mass processing (its 'exchange value').

Porat's analysis was very influential in the thinking that led to many nation states formulating policies for the 'information society'. In 1971 Japan adopted the goal to become an 'information society' by the year 2000. In 1977 the US Senate Foreign Relations Committee for the first time adopted the definition of information as a "new national resource" and proposed The New World Information Order and there followed a plethora of national reports and policies from other countries (France, India, Brazil, etc.). These reports and policies were domestic responses by each nation-state, as industrialized nations around the world responded to the decline of their manufacturing sectors. International coordination was to quickly follow, through developments such as the European FAST programme in 1980. The implications were clear: the computer was to be seen as a processor of 'information', and this was going to herald an 'information revolution' leading to a new 'information society' though, in truth, no-one was sure what these words meant.

2.3 The Limitations of Symbols

The one weakness in this growing ideology of 'information' is a fundamental weakness of logical positivism itself. Logical positivism is a philosophy based around symbolic knowledge. It is about facts encoded in a language, and as such has very little to say about things that are not facts, for example, images or sounds. For the logical positivists such forms of experience are considered 'emotional' and discounted, along with religion and other unformalized belief systems. Daniel Bell wrote: "Technical decision-making can, in fact, be viewed as the diametric opposite of ideology; the one calculating and instrumental, the other emotional and expressive" (Bell 1973).

It was the advent of the multimedia computer that began to open up some of the contradictions within this shaky ideology of computing. The languages of symbolic computing have proved to be lacking when confronted with experiences such as digital photography, digital drawing, electronic music, multimedia, virtual reality, digital animation, digital film production, computer games, mobile telephony and digital radio. Of course, there is a level at which the mathematical notion of information applies and is useful, but as a general model of communication, the 'information processing' paradigm has nothing interesting to say. When dealing with such objects of popular media, the content and context are paramount concerns: the need for a new ideology of computing, a new 'digital culture', becomes pressing.

We can see early traces of this in the 1980s when there were again two very publicly competing 'cultures' within computing. The personal computer — a complete computer for every person — had becoming economic and popular and a battle emerged between the Macintosh and the IBM PC that was ideological at least as much as it was economic. The IBM PC with its DOS operating system and ASCII screen insisted that the computer was a symbol manipulator. The Apple Macintosh, with its new graphical interface and its mouse had a vision that the computer was a visual and aural medium (Bolter and Gromola, 2003). There were many computer experts at that time who predicted that people would not want to use the unnecessary and inefficient interfaces introduced by Apple and that command-line interfaces were far more 'logical' and would therefore prevail: but they did not. The PC finally gave up the ideological fight and 'Windows for PC' was launched: at this point the basic relationship of people to the computer changed. The pure data processing / information processing model began to

lose its grip. The logic of the market had determined this change: 'users' were no longer just 'workers', they were now 'customers'.

> Computer technology is not mainly used for production, it is used for all kinds of work and leisure (and changing the relations between work, leisure, and education) ... the focus has slowly, but steadily moved away from workers towards customers ... computer technology has developed from being mainly production technology to being communication technology. (Bjerknes & Bratteteig, 1995)

Ironically, the new vision of the consumer-led information revolution— as espoused by Bill Gates and others— is a truly cybernetic one: it is of a frictionless capitalism, which is borderless and leaderless, and for which no-one is accountable (Mattelart, 2003). Thus, in 1997, and in terms highly reminiscent of C.P. Snow, we were presented with the concept of the 'Digital Citizen' who would be

> ...knowledgeable, tolerant, civic-minded, and radically committed to change. Profoundly optimistic about the future, they're convinced that technology is a force for good and that our free-market economy functions as a powerful engine for good. (Katz 1997)

Despite this vision of dystopia, there still remains the question of power. Information represents power and whichever nation has the best 'information processing systems' supposedly has the most power. But, as part of the redefinition of 'information' it has become emptied of content, and so we can (and do) no longer talk about its veracity: in the brave new world, 'information' and 'truth' very rarely have anything to do with each other for value of 'information' is in its exchange and not its use. The power of information is derived from the processing of information, true or false, and in recognition of this we find talk of 'soft power':

> the ability to arouse in others the desire for whatever it is you want them to desire, and the faculty of leading them to accept the norms and institutions that produce the desired behaviour. (Mattelart, 2003, 130)

Suddenly, the content and social dynamics of information has become important again, but this time without any necessary relationship to truthfulness.

Interlude

> In her recent novel, 'The Autograph Man' (2002), Zadie Smith has a father taking his 12 year-old son to a professional wrestling match at the Royal Albert Hall. Reading the inscription (quoted in the first paragraph of this paper), the father wonders whether professional

wrestling is an Art or a Science. He suggests to his son that there are reasons to think that it is probably a little of each. "Rubbish", says his son and when challenged as to which it is, replies, "Neither. It is TV".

3. MIXED MEDIA: MIXED CULTURES

3.1 Computers and Art

Art has been part of the evolution of computing almost from the beginning. From the early 1960s artists who were interested in kinetic art (as pioneered by Naum Gabo, László Moholy-Nagy, Jean Tinguely, Len Lye and others) had became especially interested in the idea of adaptive systems and the relationship of information to control. A formal interest in cybernetics was behind Roy Ascott's 1963 show 'Diagram Boxes and Analogue Structures' (Molton Gallery, London). Writing in 1966, Ascott described an "art of cybernetics" which referred not to any obvious relationship between the two terms, but rather to "the spirit of cybernetics, which may inform art and in turn be informed by it" (Ascott [1966] 2003, p.126). More material expressions of the relationship of cybernetics to art can be found in the work of David Medalla, for example, who in 1966 built cybernetic art works involving mud, bubbles and sand, or the theatre director, Gordon Pask, who developed adaptive lighting systems for the theatre. In 1970 Pask built an adaptive cybernetic art piece that involved communication between the different parts of the sculpture and the human spectator. In 1967, Robert Rauschenberg and Billy Klüver in New York formed a group called Experiments in Art and Technology (EAT). EAT was very influential and was also concerned with technology as a subject for art, rather than just a medium. One artist who was associated with EAT was Edward Kienholz, whose sculpture 'The friendly grey computer' in 1965 addressed a more subjective side of the relationship to the computer.

At the same time that artists were becoming interested in the concepts of cybernetics and computing, there were a number of engineers who explored the computer as a medium or as an instrument for producing more conventional forms of art. Frieder Nake produced very early graphical 'artworks' using a computer-controlled plotter ('Rectangular hatchings', 1965) and was soon followed by others who employed a variety of novel techniques to produce visual imagery (e.g. Michael Noll, Katherine Nash, Leon Harmon and Kenneth Knowlton, Charles Csuri and others). These represent technical approaches to 'computer art', which we can describe as

the production of objects that look like traditional art works and are produced by using the computer as an instrument (Lovejoy, 2004).

The growing interest in art and the computer led, in the late 1960s, to three international exhibitions that were fairly eclectic, attracted cross-disciplinary participation and are generally seen as significant and successful:

1968 Cybernetic Serendipity: The Computer and the Arts, ICA, London

1968 The Machine as Seen at the End of the Mechanical Age. MOMA, NY

1970 Software, Information Technology: Its New Meaning for Art; Jewish Museum, NY

This early interest of both artists and the art world in the potential of computers proved difficult to sustain. For those who were using the computer as an instrument, it proved to be a rather limited one once the novelty had worn off. Technically, the computers of the 1970s and 1980s lacked sufficient storage capacity and processing power, and they lacked devices that could produce good quality output. There were only a few artists who pursued computer art through the 1970s and 1980s. William Latham, for example, worked with IBM in the UK to develop complex graphical algorithms which resulted in organically inspired images and animations. Harold Cohen used learning algorithms from cognitive science to produce themed sketches, but such work rarely showed sufficient creative development to gain artistic attention or acceptance.

For the cyberneticians, who wanted to include computing devices in live exhibitions and events, the issue was not so much lack of computing power but rather lack of computer reliability. Many early works were technically very fragile and in real exhibition conditions failed to meet the reliability standards expected. In the 1970 exhibition "Software, Information Technology' many of the exhibits "did not actually work due to technical difficulties" and experiences such as this contributed to a number of artists abandoning the use of computer technology in their work (Gere 2002).

Some of these artists retained an interest in computing, but tended to explore other approaches to interactive experience, through alternative contemporary forms such as performance art and video art. Those who retained a more philosophical or intellectual involvement in the idea of cybernetics tended to move into one of the main art movements of recent decades, Conceptual Art. Early Conceptual Art was very much about the

relationship of objects to signs and symbols and strong parallels can be found between the concerns of these artists and the emerging concept of 'information'. Arguably, the interest of artists in the computer was sustained through the 1970s and 1980s but engaged with the new concept of 'information' rather than with computer technology itself.

3.2 Information, Art and Users

It is easy to form a compound noun by putting the words 'information' and 'art' together but in doing so we have not necessarily created an interesting category. In fact, the term 'information art' is rather barren. There are no books published on the subject (the one with this title actually amounts to a catalogue of science and art collaborations). I have asked several curators what they would make of the term and they either have no response, or they suggest conceptual artists such as Jenny Holzer. The term seems to have very little currency which reinforces the view that perhaps it marks some deep schism in our contemporary culture.

There is a definition of 'art' that is central to our concerns:

Art is truth without facts

(this is very similar to Picasso's famous dictum, "Art is a lie that tells the truth"). These definitions directly address the gulf between the logical positivist 'information processing' culture and the mixed media culture of the creative arts. The latter accepts that the positivist systems of knowledge may be consistent, but claims that they are not complete. There is knowledge that exists outside of the formal system and is very interesting. Because artists are not bound by any formal semantic code they are able (at least some of them) to find more direct ways of expressing this reality.

From the 1960s, Umberto Eco began writing about 'the open work': "works which the performer and the audience both help complete, through different kinds of engagement" (Eco, 1989). Perhaps one of the earliest and most seminal of pieces of art to express this idea was John Cage's 1952 performance of *4' 33"*, featuring a pianist and consisting of three short movements of silence. Part of Cage's point was that any sound performance always takes place within an environment in which there are other noises and he was in a sense arguing, albeit in an extreme form, that these need not be drowned or filtered out. A second, perhaps stronger, point was that the meaning of a performance does not depend solely upon the author or performer, but it is also created by the active participation of the audience.

This has implications for the whole dialogue of computing. If the computer is seen as a processor of universal meanings, then the human beings who surround it are passive appendages—they are simply 'users'. On the other hand, if the person who receives the information, and the context in which they receive it, are significant in the creation of meaning, then the computer cannot be assigned this abstract, universal role.

With the advent of the personal computer, the individual who sits in front of it became a customer who chooses not only which machine to purchase, but also which software to purchase and use. That put a new concept of usability high on the list of desirable features. Bill Buxton has long been concerned with comparisons between the computer and other more traditional technologies.

> I use the analogy with brushes and instruments because they are the intermediaries between what is in the mind and its realization in the external world. Like computers, these technologies also have "users," *but it is almost an insult to describe them as such.* (Buxton, 1992)

Buxton makes clear that the ideology that surrounds the computer is different from the ideology that surrounds other everyday instruments. It is less empowering, binding us to abstract languages and concepts.

> The term *user* is unfortunate (but now unavoidable), as if we were habituated or addicted to the artefact. Good digital designs do not addict; they invite us to participate, to act and react. (Bolter and Gromola, 2003)

Gradually, the impact of mixed media computing is causing the whole ideology of 'information' to begin to unravel.

4. INFORMATION COUNTER-CULTURES

4.1 Freedom of Information?

Though the computer emerged in the 1960s as a major symbol of conformity, many people working within computing at that time felt that they were part of a counter-culture (radicals within "the white heat of the technological revolution"). Computing techniques represented a new rationality—an instant way of replacing established procedures which were frequently based on prejudice and class superiority. The new technology had the potential for a new equality based upon freedom of speech, logic, transparency and empowerment.

At times this got very 'counter-cultural'. In 1965 Ted Nelson published a book 'Computer Lib/Machine Dreams'. The 1968 Fall Joint Computer Conference in the US was compared in its advance publicity to a "trippy rock concert". Computers were being seriously discussed in publications such as the *Whole Earth Catalog* and the magazine *Rolling Stone* and Timothy Leary even proclaimed the personal computer as "the LSD of the '90s". Whether expressed in such extrovert ways or in more introverted forms, such as informal dress and unusual working hours, people who worked with computers had a strong association with notions of personal freedom.

The notion of counter-culture is, however, relative to an historical context: what is counter-culture at one time may well become mainstream culture later. At first the personal libertarian ideology of people around computing was a counter-cultural position, but external political events were to change this. Ever since the beginnings of the Cold War in the late 1940s, the US State Department had promoted the doctrine of the free flow of information. It did this largely in opposition to the Soviet Bloc who often felt that cross-border information flow was equivalent to outside interference or aggression. For Cold War ideologists in the West, a particular notion of 'freedom' was central and, though this did not coincide with the personal libertarianism of the counter-culture, the distance between them was not great.

With the coming to power of Ronald Reagan and Margaret Thatcher, and the associated ideological shift towards free-market economics, a major realignment of computing occurred. Computer people do not like external authorities, external controls and restrictions on what can be done and often these sentiments led them to actively support free-market thinking. It may seem strange, but an early significant contributor to the very counter-cultural *Whole Earth Catalog* was Milton Friedman, one of the principle advocates of neo-liberal economic theory. Today, much of the counter-cultural elements of computing have been absorbed into the dominant economic libertarian culture.

From the standpoint of 2005, what can we say of the counter-culture of computing today? It is certainly ideologically fragmented in that it has no clear focus or unity. I can point to at least three separate loci of counter-cultures in computing.

4.2 Hackers and Anarchists

In the early days of computing the verb 'to hack' had a slightly different sense from what it has today. Up until the 1980s, 'to hack' meant to develop software in a manner that did not necessarily have a single rational organizing principle. A 'hacked' solution often worked but did not lead to elegant code. On the more positive side, it tended to exploit aspects of the machinery that more formal methods overlooked. It was this latter aspect, when taken in the context of communications systems, that led to the contemporary sense of the word,

> **To hack**
> To gain unauthorized access to (computer files, etc., or information held in one). (OED)

Despite many crackdowns by authorities, and many new laws and prosecutions, 'hacking' (in the contemporary sense) continues and has a vein of tacit support running right through the computing community. In the 1980s a number of hackers groups were formed (414s, Legion of Doom, Chaos Computer Club) and some not only still exist today, but are quite strong.

In 1990, a seemingly unlikely combination of people (a lyricist of a famous rock group, a Republican Party politician, the founder of a major software company and the founder of the *Whole Earth* project) came together to start the Electronic Frontier Foundation (EFF) dedicated to the preservation of free speech and freedom of expression in the new media (www.eff.com). It describes itself as "a modern group of freedom fighters" and adds "we fight measures that threaten basic human rights. Only the dominion we defend is the vast wealth of digital information, innovation, and technology that resides online". It extends this to defending hackers who have run foul of the law.

On the one hand, hacking is very negative and causes a great deal of frustration and expense; on the other, many people within computing see hacking as having a counter-cultural aspect that engenders some sympathy. We do not want to see the system win every time; we support the lonely underdog against the system. Given a chase between the police and someone they are chasing, there is (as the O.J. Simpson example showed) still a strong cultural identification with the person being chased.

4.3 Political Activism

On February 11, 1995 a letter was distributed widely throughout electronic networks containing an appeal from the "The Indigenous Clandestine Revolutionary Committee, General Command of the EZLN". It read:

> Brothers and sisters, the government of Ernesto Zedillo is killing us, it is killing children, it is attacking women and raping them. We ask the people of Mexico and all the people of the world to do something to stop this war.

This is often cited as the first major example of the use of Internet to raise international support for a political struggle. The EZLN has been involved in a civil insurrection against the Mexican government in the region of Chiapas since 1994 and made this use of the Internet to gain international support to stop an intensive military campaign against them. It was a tactic that was largely successful.

On 27 June 2002 thousands of trade unionists around the world took part in protest action calling for the immediate release of imprisoned trade unionists in South Korea. In the run-up to Korea co-hosting the football World Cup, a total of 52 trade unionists were in prison on account of legitimate activities, including the president of the Korean Confederation of Trade Unions. A concerted international day of action was organized directly through the use of digital communications technology. It was successful in getting several unionists released from prison (http://www.imfmetal.org/main/index.cfm?id=47&l=2&cid=7204 also http://www.global-unions.org/korea2002.asp).

These are but two of many examples of the Internet being used for political action that is counter to state power. It had long raised concerns within the US Military,

> ... an insurgent or drug trafficking group's access to and utilization of electronic media technology for exploiting the information superhighway will bolster their support networks and enhance their command and control. (U.S. Army intelligence, 1994)

The US Dept of Defense, working within the paradigm of the free-flow of information, saw the Internet as a potential new medium for the extension of Cold War policies:

> The Internet is clearly a significant long term strategic threat to authoritarian regimes, one that they will be unable to counter effectively. News from the outside world brought by the Internet into nations subjugated by such regimes will clash with the distorted versions provided by their governments, eroding the credibility of their positions and encouraging unrest. (Swett, 1995)

It was then but a short step to argue that freedom of information provides the context for a new type of human intervention. To ensure that US foreign policy prevails, the Report suggests that the Internet may be used 'offensively',

> The U.S. might be able to employ the Internet offensively to help achieve unconventional warfare objectives. ...Just as the U.S. could be vulnerable to disinformational e-mail, politically active groups using the Internet could be vulnerable to deceptive messages introduced by hostile persons or groups. ...
>
> Some of its uses might include...Cultivating political and even operational support for the U.S. side and opposition to the other side. (Swett, 1995)

Faced with such blatant political use of the Internet, the counter-culture has developed more imaginative responses. One example of such political activism is the activities of the 'Yes Men', recently recorded in a full-length documentary film. The 'Yes Men' have been involved in a number of actions aimed at what they term, 'Identity Correction'. For example, through their ownership of the domain name for GATT (the precursor of the World Trade Organization) they occasionally receive requests to send speakers to conferences in the belief that they are the real WTO. On occasions they have responded and sent a speaker who, in a creative way, tries to give a more 'correct' view of the organization, i.e., one as seen from a counter-cultural perspective (see www.theyesmen.org). For an example of their activities, see the following announcement on their website.

> WTO to announce schedule for disbanding
>
> After a protracted and detailed review of current trade policy and its effects on developing countries, the World Trade Organization has decided to effect a cessation of all operations, to be accomplished over a period of several months. The WTO will eventually reintegrate as a new trade body whose charter will be to ensure that trade benefits the poor. (www.gatt.org)

4.4 Digital Artists and Designers

The work of digital artists has also, at times, been seen in opposition to mainstream culture. In 1971 a retrospective exhibition by the cybernetic artist Hans Haacke at the Guggenheim Museum in New York was cancelled because one of the proposed works was a list of the real-estate holdings of the trustees of the museum.

Artists were part of the large Internet campaign to organize opposition to the latest war against Iraq. On Monday, 3 March 2003, artists and performers in 59 countries co-ordinated 1,029 readings of *Lysistrata*, Aristophanes' anti-war comedy, to protest the Bush Administration's unilateral war on Iraq (www.lysistrata.com) in what was billed as the "First-Ever Worldwide Theatrical Act Of Dissent".

A few artists have chosen to directly address the computer interface as the content of their art and produce works that make us feel uncomfortable because what we take as basic and given—the operating system, or common applications software—no longer behaves as we expect. For example, in 1995, Jeff Instone used the Macintosh WIMP interface as the vehicle for an 'interactive text' ('The Word Beyond Speech', 1995); or more recently Adrian Ward created 'Auto-Illustrator', a seeming copy of Adobe Illustrator with some unexpected responses and which he describes as a "parody of commercial software" (www.signwave.co.uk). Part of the purpose of these works is to demonstrate that the computer need not always be as it appears, that the operating system and software you use are the result of conscious design and could have been, and could be, different.

While such interventions are still, in a sense, oppositional, as we move from considering art to design, we move to a different set of issues (Winograd and Flores, 1987). In their book *Windows and Mirrors*, Bolter and Gromola point to a contemporary debate within the digital design community. On the one side there are the so-called 'structuralists' who believe that the ultimate aim of good design is the invisibility or transparency of the designed object. Hence, Donald Norman wrote a book entitled *The Invisible Computer* (Norman, 1998) in which he argued that computers will disappear into 'information appliances', in just the same way as electric motors have disappeared into vacuum cleaners, power tools and DVD-players.

A similar viewpoint to Norman's has been put forward by Jakob Nielsen (2000) with respect to web design. Nielsen argues that web pages should be

transparent vehicles for information delivery. The information exists outside the system and the web page design should simply, efficiently and effectively deliver the required information to the user. It is a classical position from within the 'information processing' paradigm. There is a strict distinction between form and content; the design of digital interfaces is part of the 'form' and its role should be to provide access to the content without distortion of any kind. This is an inherently conservative position as it requires complete adherence to the cultural norm of representation. One is not allowed to question, or even embellish, the coded information within the system.

Against this viewpoint is the influence, within multimedia computing, of a growing number of film makers, graphic designers, artists and performers who simply do not accept that the 'message' is separate from the 'medium' and who see the process of narration, of telling, of revealing as being "to fascinate, exhilarate, and sometimes provoke us" (Bolter and Gromola, 2003). These designers do not accept that the technology works within an 'information processing' paradigm, and they produce works that at least open up a more engaging and open relationship between the computer and the person who experiences it.

Many of today's digital artists and designers are challenging the intention of software designers and finding unexpected new uses for the technology. Artists are using networking to establish working co-operatives that exchange work and enable many artists to contribute to the same work. Performers are using the Internet as a stage upon which to create novel performance work. Within these and other works it is possible to see elements of disrespect for the supposed functionality of the software, but also a disruptive element that can be traced back to Brecht.

5. CONCLUSION

We have seen how discourses of the Arts and Sciences are not only different but that, at different historical stages, they have had different relationships to questions of accountability, responsibility, ethics, values and politics. From the 1930s to the 1960s the sciences were seen as progressive within Western societies, but by the 1970s they had retreated to a claimed neutrality and by the twenty-first century the word 'technical' has conservative connotations, signifying a lack of fundamental questioning. It is only be 'breaking the rules', by 'thinking outside the box' and by being 'creative' that progress is now made.

Insofar as we can consider the digital computer as a focus for a description of society, then we may observe that while it initially thrived upon an alternative and libertarian culture, this has become absorbed in the new dominant culture of the free-market, through which concepts such as 'information' and 'information society' have become accepted uncritically as part of the common system of thought.

From the beginnings of computing there have always been alternative views, the earliest probably being that of cybernetics. These have been put aside in the social and political shaping of computing and it is only recently that the conditions have been such for new alternatives to emerge. These have often been in the guise of the Arts and have been associated with anti-capitalist political movements which currently form about the only ideological opposition from within Western societies.

So, while it is important to pursue ethics and accountability from within the dominant cultural perspective that will always be, in my view, 'negative ethics', which is to say that it will attempt to respond to particular issues that have arisen in agendas such as globalization, the information society and the global free-flow of information. It is work that, of course, has to be undertaken, but it is not the only work. There is also the work of daring to imagine how things might be different, of helping to design an alternative future, one that is positive and one that a person can believe in. The inspiration for this will come from artists, from counter-cultures, and many others, but the work itself is that of designers. It is time to reassert the politics of design and time that scientists, in the broadest sense, attempted to return to the position they held over 50 years ago – as optimists who believed that they could tackle and solve major problems in the world, such as the division between the rich and the poor.

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