

1 New Media and New Technologies

1.1 New media: do we know what they are?

This book is a contribution to answering the question, 'What is new about "new media"?' It also offers ways of thinking about that question, ways of seeking answers. Here, at the outset, we ask two prior questions. First, 'What are media anyway?'. When you place the prefix 'new' in front of something it is a good idea to know what you are talking about and 'media' has long been a slippery term (we will also have a lot to say about that in various parts of the book). Second, what, at face value and before we even begin to interrogate them, do we include as 'new media'?

1.1.1 Media studies

For some sixty years the word 'media', the plural of 'medium', has been used as a singular collective term, as in 'the media' (Williams 1976: 169). When we have studied the media we usually, and fairly safely, have had in mind 'communication media' and the specialised and separate institutions and organisations in which people worked: print media and the press, photography, advertising, cinema, broadcasting (radio and television), publishing, and so on. The term also referred to the cultural and material products of those institutions (the distinct forms and **genres** of news, road movies, soap operas which took the material forms of newspapers, paperback books, films, tapes, discs: Thompson 1971: 23–24). When systematically studied (whether by the media institutions themselves as part of their market research or by media academics inquiring critically into their social and cultural significance) we paid attention to more than the point of media production which took place within these institutions. We also investigated the wider processes through which information and representations (the 'content') of 'the media' were distributed, received and consumed by audiences and were regulated and controlled by the state or the market.

We do, of course, still do this, just as some of us still watch 90-minute films, in the dark, at the cinema, or gather as families to watch in a fairly linear way an evening's scheduled 'broadcast' television. But many do not consume their 'media' in such ways. These are old habits or practices, residual options among many other newer ones. So, we may sometimes continue to think about media in the ways we described above, but we do so within a changing context which, at the very least, challenges some of the assumed categories that description includes.

For example, in an age of trans-mediality we now see the migration of content and intellectual property across media forms, forcing all media producers to be aware of and collaborate with others. We are seeing the fragmentation of television, the blurring of boundaries

For more on these particular developments see: 3.16, 3.22, 3.23

(as in the rise of the 'citizen journalist'); we have seen a shift from 'audiences' to 'users', and from 'consumers' to 'producers'. The screens that we watch have become both tiny and mobile, and vast and immersive. It is argued that we now have a media economics where networks of many small, minority and niche markets replace the old 'mass audience' (see The Long Tail 3.13). Does the term 'audience' mean the same as it did in the twentieth century? Are media genres and media production skills as distinct as they used to be? Is the 'point of production' as squarely based in formal media institutions (large specialist corporations) as it used to be? Is the state as able to control and regulate media output as it once was? Is the photographic (lens based) image any longer distinct from (or usefully contrasted to) digital and computer generated imagery?

However, we should note right now (because it will be a recurring theme in this book), that even this very brief indication of changes in the forms, production, distribution, and consumption of media is more complex than the implied division into the 'old' and 'new' suggest. This is because many of these very shifts also have their precedents, their history. There have long been minority audiences, media that escape easy regulation, hybrid genres and 'inter-texts' etc. In this way, we are already returned to the question 'What is "new" about "new media"?' What is continuity, what is radical change? What is truly new, what is only apparently so?

Despite the contemporary challenges to its assumptions, the importance of our brief description of 'media studies' above is that it understands media as fully social institutions which are not reducible to their technologies. We still cannot say that about 'new media', which, even after almost thirty years, continues to suggest something less settled and known. At the very least, we face, on the one hand, a rapid and ongoing set of technological experiments and entrepreneurial initiatives; on the other, a complex set of interactions between the new technological possibilities and established media forms. Despite this the singular term 'new media' is applied unproblematically. Why? Here we suggest three answers. First, new media are thought of as epochal; whether as cause or effect, they are part of larger, even global, historical change. Second, there is a powerful utopian and positive ideological charge to the concept 'new'. Third, it is a useful and inclusive 'portmanteau' term which avoids reducing 'new media' to technical or more specialist (and controversial) terms.

1.1.2 The intensity of change

The term 'new media' emerged to capture a sense that quite rapidly from the late 1980s on, the world of media and communications began to look quite different and this difference was not restricted to any one sector or element of that world, although the actual timing of change may have been different from medium to medium. This was the case from printing, photography, through television, to telecommunications. Of course, such media had continually been in a state of technological, institutional and cultural change or development; they never stood still. Yet, even within this state of constant flux, it seemed that the nature of change that was experienced warranted an absolute marking off from what went before. This experience of change was not, of course, confined only to the media in this period. Other, wider kinds of social and cultural change were being identified and described and had been, to varying degrees, from the 1960s onwards. The following are indicative of wider kinds of social, economic and cultural change with which new media are associated:

- **A shift from modernity to postmodernity:** a contested, but widely subscribed attempt to characterise deep and structural changes in societies and economies from the 1960s

onwards, with correlative cultural changes. In terms of their aesthetics and economies new media are usually seen as a key marker of such change (see e.g. Harvey 1989).

- **Intensifying processes of globalisation:** a dissolving of national states and boundaries in terms of trade, corporate organisation, customs and cultures, identities and beliefs, in which new media have been seen as a contributory element (see e.g. Featherstone 1990).
- **A replacement, in the West, of an industrial age of manufacturing by a 'post-industrial' information age:** a shift in employment, skill, investment and profit, in the production of material goods to service and information 'industries' which many uses of new media are seen to epitomise (see e.g. Castells 2000).
- **A decentring of established and centralised geopolitical orders:** the weakening of mechanisms of power and control from Western colonial centres, facilitated by the dispersed, boundary-transgressing, networks of new communication media.

New media were caught up with and seen as part of these other kinds of change (as both cause and effect), and the sense of 'new times' and 'new eras' which followed in their wake. In this sense, the emergence of 'new media' as some kind of epoch-making phenomena, was, and still is, seen as part of a much larger landscape of social, technological and cultural change; in short, as part of a new **technoculture**.

1.1.3 The ideological connotations of the new

There is a strong sense in which the 'new' in new media carries the ideological force of 'new equals better' and it also carries with it a cluster of glamorous and exciting meanings. The 'new' is 'the cutting edge', the 'avant-garde', the place for forward-thinking people to be (whether they be producers, consumers, or, indeed, media academics). These connotations of 'the new' are derived from a modernist belief in social progress as delivered by technology. Such long-standing beliefs (they existed throughout the twentieth century and have roots in the nineteenth century and even earlier) are clearly reinscribed in new media as we invest in them. New media appear, as they have before, with claims and hopes attached; they will deliver increased productivity and educational opportunity (**4.3.2**) and open up new creative and communicative horizons (**1.3**, **1.5**). Calling a range of developments 'new', which may or may not be new or even similar, is part of a powerful ideological movement and a narrative about progress in Western societies (**1.5**).

This narrative is subscribed to not only by the entrepreneurs, corporations who produce the media hardware and software in question, but also by whole sections of media commentators and journalists, artists, intellectuals, technologists and administrators, educationalists and cultural activists. This apparently innocent enthusiasm for the 'latest thing' is rarely if ever ideologically neutral. The celebration and incessant promotion of new media and **ICTs** in both state and corporate sectors cannot be dissociated from the globalising **neo-liberal** forms of production and distribution which have been characteristic of the past twenty years.

1.1.4 Non-technical and inclusive

'New media' has gained currency as a term because of its useful inclusiveness. It avoids, at the expense of its generality and its ideological overtones, the reductions of some of its

4.3.2 Edutainment, edutainment, edutainment
1.3 Change and continuity
1.5 Who was dissatisfied with old media?

Case study 1.3 What is new about interactivity?

alternatives. It avoids the emphasis on purely technical and formal definition, as in **'digital'** or **'electronic'** media; the stress on a single, ill-defined and contentious quality as in **'interactive media'**, or the limitation to one set of machines and practices as in **'computer-mediated communication'** (CMC).

So, while a person using the term 'new media' may have one thing in mind (the Internet), others may mean something else (digital TV, new ways of imaging the body, a virtual environment, a computer game, or a blog). All use the same term to refer to a range of phenomena. In doing so they each claim the status of 'medium' for what they have in mind and they all borrow the glamorous connotations of 'newness'. It is a term with broad cultural resonance rather than a narrow technician or specialist application.

There is, then, some kind of sense, as well as a powerful ideological charge, in the singular use of the term. It is a term that offers to recognise some big changes, technological, ideological and experiential, which actually underpin a range of different phenomena. It is, however, very general and abstract.

We might, at this point, ask whether we could readily identify some kind of fundamental change which underpins all new media – something more tangible or more scientific than the motives and contexts we have so far discussed. This is where the term 'digital media' is preferable for some, as it draws attention to a specific means (and its implications) of the registration, storage, and distribution of information in the form of digital binary code. However, even here, although digital media is accurate as a formal description, it presupposes an absolute break (between **analogue** and digital) where we will see that none in fact exists. Many digital new media are reworked and expanded versions of 'old' analogue media (**1.2.1**).

1.1.5 Distinguishing between kinds of new media

The reasons for the adoption of the abstraction 'new media' such as we have briefly discussed above are important. We will have cause to revisit them in other sections of this part of the book (**1.3, 1.4, 1.5**) as we think further about the historical and ideological dimensions of 'newness' and 'media'. It is also very important to move beyond the abstraction and generality of the term; there is a need to regain and use the term in its plural sense. We need to ask what the new media are *in their variety and plurality*. As we do this we can see that beneath the general sense of change we need to talk about a range of different kinds of change. We also need to see that the changes in question are ones in which the ratios between the old and the new vary (**1.3**).

Below, as an initial step in getting clearer about this, we provide a schema that breaks down the global term 'new media' into some more manageable constituent parts. Bearing in mind the question marks that we have already placed over the 'new', we take 'new media' to refer to the following:

- **New textual experiences:** new kinds of **genre** and **textual** form, entertainment, pleasure and patterns of media consumption (computer games, simulations, special effects cinema).
- **New ways of representing the world:** media which, in ways that are not always clearly defined, offer new representational possibilities and experiences (immersive virtual environments, screen-based interactive multimedia).
- **New relationships between subjects (users and consumers) and media technologies:** changes in the use and reception of image and communication media in everyday life and in the meanings that are invested in media technologies (**3.1–3.10** and **4.3**).

- ***New experiences of the relationship between embodiment, identity and community***: shifts in the personal and social experience of time, space, and place (on both local and global scales) which have implications for the ways in which we experience ourselves and our place in the world.
- ***New conceptions of the biological body's relationship to technological media***: challenges to received distinctions between the human and the artificial, nature and technology, body and (media as) technological prostheses, the real and the **virtual (5.1 and 5.4)**.
- ***New patterns of organisation and production***: wider realignments and integrations in media culture, industry, economy, access, ownership, control and regulation (**3.5–3.22**).

If we were to set out to investigate any one of the above, we would quickly find ourselves encountering a whole array of rapidly developing fields of technologically mediated production (user-generated content) and even a history of such as the site for our research. These would include:

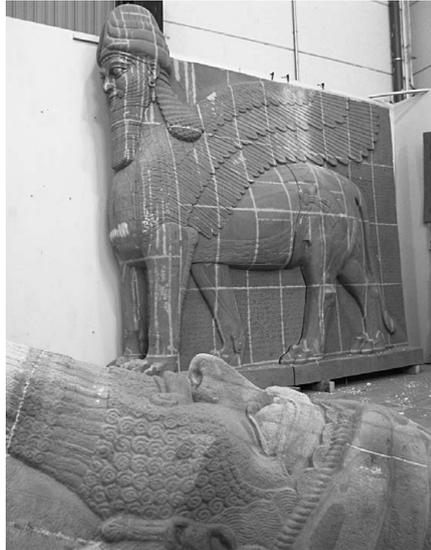
- ***Computer-mediated communications***: **email**, chat rooms, **avatar**-based communication forums, voice image transmissions, the World Wide Web, blogs etc., social networking sites, and mobile telephony.
- ***New ways of distributing and consuming*** media texts characterised by interactivity and hypertextual formats – the World Wide Web, CD, DVD, Podcasts and the various platforms for computer games.
- ***Virtual 'realities'***: simulated environments and immersive representational spaces.
- ***A whole range of transformations and dislocations of established media*** (in, for example, photography, animation, television, journalism, film and cinema).

1.2 The characteristics of new media: some defining concepts

In **1.1** we noted that the unifying term 'new media' actually refers to a wide range of changes in media production, distribution and use. These are changes that are technological, textual, conventional and cultural. Bearing this in mind, we nevertheless recognise that since the mid-1980s at least (and with some changes over the period) a number of concepts have come to the fore which offer to define the key characteristics of the field of new media as a whole. We consider these here as some of the main terms in discourses about new media. These are: **digital, interactive, hypertextual, virtual, networked, and simulated**.

Before we proceed with this, we should note some important methodological points that arise when we define the characteristics of a medium or a media technology. What we are calling 'characteristics' here (digital, interactive, hypertextual etc.) can easily be taken to mean the 'essential qualities' of the medium or technology in question. When this happens being 'digital', for example, ceases to mean a source of possibilities, to be used, directed, and exploited. It becomes, instead, a totalising or overarching concept which wholly subsumes the medium in question. There is then a danger that we end up saying, 'Because a technology is like "this" (electronic, composed of circuits and pulses which transform colour, sound, mass or volume into binary digital code) it *necessarily* results in "that" (networked, fleeting and immaterial products)'. To make this move risks the accusation of 'essentialism' (an 'essentialist' being someone who argues that a thing is what it is because it possesses an unchanging and separable essence: see **5.4.6**).

(Bruno Latour,
‘Alternative digitality’
at: http://www.bruno-latour.fr/presse/presse_art/GB-05%20DOMUS%2005-04.html)



1.1 One of the complete human-headed lions from the entrance to the throneroom of Ashurnasirpal II now in the British Museum. The head of a corresponding sculpture can be seen in the foreground. These two figures were recorded using a NUB 3D Triple White light scanning system. They were recorded and milled at a resolution of 400 microns. Photograph by Factum Arte

With regard to ‘digitality’ an instructive example is offered by the work carried out by the artists and technicians of ‘Factum–Arte’, a group who use digital technology to reproduce ancient artefacts such as sculptures, monuments, bas-reliefs and paintings (<http://www.factum-arte.com/eng/default.asp>). These are not virtual, screen based replicas of the original works but material facsimiles (‘stunning second originals’) achieved by computers and digital technology driving and guiding powerful 3-D scanners, printers and drills. Here, the ‘digital’ produces hefty material objects rather than networked, fleeting and immaterial things (see **Figs 1.1** and **1.2**). This may be a rare case of digital technology being directly connected to the production of physically massive artefacts rather than flickering images on screens (the ‘virtual’) but it nevertheless warns against the kind of ‘this therefore that’ (digital) essentialism we warned of above.

On the other hand, while traditional media studies is wary of doing so (see **1.6–1.6.5**, **4.3.4**, and **5.1–5.1.10**), in **5.4.6** we also argue that it is very important to pay attention to the physical and material constitution of a technology (a digital media-technology no less than a heavy industrial manufacturing technology), not just its cultural meanings and social applications. This is because there is a real sense in which the physical nature and constitution of a technology encourages and constrains its uses and operation. To put this very basically, some technologies are tiny things, some are large and hefty. In terms of media technologies, compare an iPod to a 1980s ‘ghetto-blaster’ (**Fig 1.3**), or a 1940s ‘radiogram’ (**Fig 1.4**) and consider the influence that their sheer size has on how they are used, where and by whom, quite apart from matters such as the lifestyles and cultural meanings that may be attached to these objects.

Such physical properties of technologies are real. They change the environments and ecologies, natural and social, in which they exist. They seriously constrain the range of purposes to which they can be put and powerfully encourage others. Hence, recognising what a technology is – really and physically – is a crucial, if a partial and qualified aspect of a media technology’s definition. This does not mean that we should reduce technology to its physical features because in doing that we would become essentialist about technological objects; we would arrive at a technological essentialism.

Let us take a final example from ‘old’ media: broadcast television (or radio). It is common



1.2 The feet of one of the human-headed lions from the entrance to the throneroom of Ashurnasirpal II now in the British Museum. The 3-dimensional data was recorded using a NUB 3D Triple White light scanning system and milled at a resolution of 400 microns. On the computer screen is an image of the scanned data which is directly compared to the facsimile to ensure accuracy. Photograph by Factum Arte



1.3 1980s ghetto-blaster. © Stone/Getty Images



1.4 1940s radiogram. England, 1940, WWII forces sweetheart, singer Vera Lynn places a record on her radiogram. Photo © Popperfoto/Getty Images

The question of determination (technological or other) is a more complex question, and is dealt with in 1.6.6 and 5.2

(especially when contrasted to digital networked media) to think of television as a centralised medium – broadcasting out from a centre to a mass audience. This is not because the technology of television inevitably leads to centralisation (just as Factum-Arte's digitality doesn't inevitably lead to virtuality) but it does lend itself to such a use; it readily facilitates centralisation. Of course, alternative uses of broadcast media existed as in 'ham' and CB radio, in local television initiatives in many parts of the world, or even the use of the television receiver as a sculptural light-emitting object in the video installations of the artist Nam June Paik. Nevertheless television came to be developed and put to use dominantly in a centralising direction. That is, television came to be organised in this way within a social structure which needed to communicate from centres of power to the periphery (the viewer/listener). Recognising that a single media technology can be put to a multiplicity of uses, some becoming dominant and others marginal for reasons that can be cultural, social, economic or political as well as technological, is one important way of understanding what a medium is (1.6).

So, our approach here, in identifying new media's 'characteristics', is not meant to lead to or endorse essentialism but to take seriously the physical constitution and operation of technologies as well as the directions in which they have been developed. Being 'digital' is a real state and it has effects and potentialities. On the other hand, this does not mean that 'being digital' is a full description or wholly adequate concept of something. There is, then, a difference between assuming or asserting that we have detected the essence of something and recognising the opportunities or constraints that the nature of a media technology places before us. A useful term here, taken from design theory, is 'affordance' which refers to

the perceived and actual properties of (a) thing, primarily those fundamental properties that determine just how the thing could possibly be used . . . A chair affords ('is for') support, and, therefore, affords sitting. A chair can also be carried. Glass is for seeing through, and for breaking.

(Norman 2002: 9).

'Affordance' draws our attention to the actions that the nature of a thing 'invites' us to perform. It is in this spirit that we now discuss the defining characteristics of new media.

1.2.1 Digital

We need first of all to think about why new media are described as digital in the first place – what does 'digital' actually mean in this context? In addressing this question we will have cause to define digital media against a very long history of analogue media. This will bring us to a second question. What does the shift from analogue to digital signify for producers, audiences and theorists of new media?

In a digital media process all input data are converted into numbers. In terms of communication and representational media this 'data' usually takes the form of qualities such as light or sound or represented space which have already been coded into a 'cultural form' (actually 'analogues'), such as written text, graphs and diagrams, photographs, recorded moving images, etc. These are then processed and stored as numbers and can be output in that form from **online** sources, digital disks, or memory drives to be decoded and received as screen displays, dispatched again through telecommunications networks, or output as 'hard copy'. This is in marked contrast to analogue media where all input data is converted into another physical object. 'Analogue' refers to the way that the input data (reflected light from a textured surface, the live sound of someone singing, the inscribed marks of someone's

handwriting) and the coded media product (the grooves on a vinyl disc or the distribution of magnetic particles on a tape) stand in an analogous relation to one another.

Analogues

'Analogue' refers to processes in which one set of physical properties can be stored in another 'analogous' physical form. The latter is then subjected to technological and cultural coding that allows the original properties to be, as it were, reconstituted for the audience. They use their skills at e.g. watching movies to 'see' the 'reality' through the analogies. *Analogos* was the Greek term which described an equality of ratio or proportion in mathematics, a transferable similarity that by linguistic extension comes to mean a comparable arrangement of parts, a similar ratio or pattern, available to a reader through a series of transcriptions. Each of these transcriptions involves the creation of a new object that is determined by the laws of physics and chemistry.

CASE STUDY 1.1: Analogue and digital type

Consider how this book would have been produced by the analogue print process which used discrete, movable pieces of metal type; *the way of producing books in the 500 years between Gutenberg's mid fifteenth-century invention of the printing press and the effective introduction of digital printing methods in the 1980s.* Handwritten or typed notes would have been transcribed by a typesetter who would have set the pages up using lead type to design the page. This type would then have been used with ink to make a physical imprint of the words onto a second artefact – the book proofs. After correction these would have been transcribed once more by the printer to make a second layout, which would again have been made into a photographic plate that the presses would have used to print the page. Between the notebook and the printed page there would have been several analogous stages before you could read the original notes. If, on the other hand, we write direct into word processing software every letter is immediately represented by a numerical value as an electronic response to touching a key on the keyboard rather than being a direct mechanical impression in paper caused by the weight and shape of a typewriter 'hammer' (see Hayles 1999: 26, 31). Layout, design and correction can all be carried out within a digital domain without recourse to the painstaking physical work of type manipulation.

Analogue media, mass production and broadcasting

The major media of the nineteenth and early twentieth centuries (prints, photographs, films and newspapers) were the products not only of analogue processes but also of technologies of mass production. For this reason, these traditional mass media took the form of industrially mass-produced physical artefacts which circulated the world as copies and commodities.

With the development of broadcast media, the distribution and circulation of such media as physical objects began to diminish. In broadcast media the physical analogue properties of image and sound media are converted into further analogues. These are wave forms of differing lengths and intensities which are encoded as the variable voltage of transmission signals. In live broadcast media such as pre-video television or radio there was a direct conversion of events and scenes into such electronic analogues.

This electronic conversion and transmission (broadcast) of media like film, which is a physical analogue, suggests that digital media technologies do not represent a complete break with traditional analogue media. Rather, they can be seen as a continuation and extension of a principle or technique that was already in place; that is to say, the principle of conversion from physical artefact to signal. However, the scale and nature of this extension are so significant that we might well experience it not as a continuation but as a complete break. We now look at why this is so.

For a detailed discussion of the differences between analogue and digital processes see T. Binkley, 'Reconfiguring culture' in P. Hayward and T. Wollen, *Future Visions: new technologies of the screen*, London: BFI (1993)

Digital media

In a digital media process the physical properties of the input data, light and sound waves, are not converted into another object but into numbers; that is, into abstract symbols rather than analogous objects and physical surfaces. Hence, media processes are brought into the symbolic realm of mathematics rather than physics or chemistry. Once coded numerically, the input data in a digital media production can immediately be subjected to the mathematical processes of addition, subtraction, multiplication and division through **algorithms** contained within software.

It is often mistakenly assumed that 'digital' means the conversion of physical data into binary information. In fact, digital merely signifies the assignation of numerical values to phenomena. The numerical values could be in the decimal (0–9) system; each component in the system would then have to recognise ten values or states (0–9). If, however, these numerical values are converted to binary numbers (0 and 1) then each component only has to recognise two states, on or off, current or no current, zero or one. Hence all input values are converted to binary numbers because it makes the design and use of the pulse recognition components that are the computer so much easier and cheaper.

This principle of converting all data into enormous strings of on/off pulses itself has a history. It is traced by some commentators from the late seventeenth-century philosopher Leibniz, through the nineteenth-century mathematician and inventor, Charles Babbage, to be formulated seminally by Alan Turing in the late 1930s (Mayer 1999: 4–21). The principle of binary digitality was long foreseen and sought out for a variety of different reasons. However, without the rapid developments in electronic engineering begun during the Second World War it would have remained a mathematical principle – an idea. Once the twin engineering goals of miniaturisation and data compression had combined with the principle of encoding data in a digital form massive amounts of data could be stored and manipulated.

In the last decades of the twentieth century the digital encoding of data moved out from the laboratories of scientific, military and corporate establishments (during the mainframe years) to be applied to communications and entertainment media. As specialist software, accessible machines and memory-intensive hardware became available, first text and then sound, graphics and images became encodable. The process swiftly spread throughout the analogue domain, allowing the conversion of analogue media texts to digital bit streams.

The principle and practice of digitisation is important since it allows us to understand how the multiple operations involved in the production of media texts are released from existing only in the material realm of physics, chemistry and engineering and shift into a symbolic computational realm. The fundamental consequences of this shift are that:

- media texts are 'dematerialised' in the sense that they are separated from their physical form as photographic print, book, roll of film, etc. (However see the section 'Digital processes and the material world' for an account of why this does not mean that digital media are 'immaterial'.)
- data can be compressed into very small spaces;
- it can be accessed at very high speeds and in non-linear ways;
- it can be manipulated far more easily than analogue forms.

The scale of this quantitative shift in data storage, access and manipulation is such that it has been experienced as a qualitative change in the production, form, reception and use of media.

See W. J. Mitchell, *The Reconfigured Eye*, Cambridge, Mass.: MIT Press (1992), pp. 1–7, 18–19, and footnote on p. 231

Fixity and flux

Analogue media tend towards being fixed, where digital media tend towards a permanent state of flux. Analogue media exist as fixed physical objects in the world, their production being dependent upon transcriptions from one physical state to another. Digital media may exist as analogue hard copy, but when the content of an image or text is in digital form it is available as a mutable string of binary numbers stored in a computer's memory.

The essential creative process of editing is primarily associated with film and video production, but in some form it is a part of most media processes. Photographers edit contact strips, music producers edit 'tapes'; and of course written texts of all kinds are edited. We can use the process of editing to think further about the implications of 'digitality' for media.

To change or edit a piece of analogue media involved having to deal with the entire physical object. For instance, imagine we wanted to change the levels of red on a piece of film as an analogue process. This would involve having to 'strike' new prints from the negative in which the chemical relationship between the film stock and the developing fluid was changed. This would entail remaking the entire print. If the original and inadequate print is stored digitally every pixel in every frame has its own data address. This enables us to isolate only the precise shots and even the parts of the frame that need to be changed, and issue instructions to these addresses to intensify or tone down the level of red. The film as a digital document exists near to a state of permanent flux until the final distribution print is struck and it returns to the analogue world of cinematic exhibition. (This too is changing as films get played out from servers rather than projectors in both on-demand digital TV and movie theatres.)

Any part of a text can be given its own data address that renders it susceptible to interactive input and change via software. This state of permanent flux is further maintained if the text in question never has to exist as hard copy, if it is located only in computer memories and accessible via the Internet or the web. Texts of this kind exist in a permanent state of flux in that, freed from authorial and physical limitation, any net user can interact with them, turning them into new texts, altering their circulation and distribution, editing them and sending them, and so on. This fundamental condition of digitality is well summarised by Pierre Lévy:

The established differences between author and reader, performer and spectator, creator and interpreter become blurred and give way to a reading writing continuum that extends from the designers of the technology and networks to the final recipient, each one contributing to the activity of the other – the disappearance of the signature.

(Lévy 1997: 366)

Digital processes and the material world

So digitisation creates the conditions for inputting very high quantities of data, very fast access to that data and very high rates of change of that data. However, we would not want to argue that this represents a complete transcendence of the physical world, as much digital rhetoric does. The limits of the physical sciences' ability to miniaturise the silicon chip may have already have been reached although current research on nano-circuits promises to reduce their current size by many times.

Although wireless connections between computers and servers and to networks are becoming increasingly common, many connections continue to rely upon cables and telephone lines, which have to be physically dug into the earth. On a more day-to-day level the constant negotiations that any computer-based media producer has to make between memory and compression are also testament to the continuing interface with the physical

For news on nano-chip developments see:
<http://www.science.daily.com/releases/2006/07/060708082927.htm>

CASE STUDY 1.2: Email: the problem of the digital letter

One estimate suggests that there are now over 1.2 billion, and rising, email users in the world (see: <http://www.radicati.com/>). For those of us within that sixth of the world's population email is now an everyday medium; part of the everyday routines which have dropped below the level of conscious attention. Yet 'e-mail' (electronic mail) developed alongside or within the wider development of the Internet from its origins in more local networks such as ARPANET from the 1970s on. In this sense it was simply a way of writing terse notes or messages in much the same way as people wrote and sent notes or letters to one another with the advantage of much more rapid delivery. However, as the ownership of networked PCs grew, and email applications became widely available, commercially or as free downloads, the email came to replace the written letter for very large numbers of people. There is more to this than meets the eye (not least for the postal services that still exist worldwide) and it continues to be a useful case study in thinking about the significance of digitality.

The conventional letter had specific and valuable characteristics and an important history (and for some people, it still has. Indeed, some of the characteristics of email communication that we discuss below have led to a certain re-evaluation of the 'letter'). The letter requires physical production, it has to be written or typed, put into an envelope, licked, posted in a special box. It is then subject to the vast enterprise of the post office system in which each house is a physicalised data address.

In addition to these material properties the letter has an important history as a literary and cultural form. Until industrialisation interpersonal communication over distance by writing depended upon the physical transportation of the text by messenger, hand to hand. Public or private news took days or weeks to move from one part of a country, or empire, to another. This pace of transmission had an effect upon the status of the message: the arrival of a letter in pre-industrial society was an 'occasion', replete with significance.

The commercial and military imperatives of industrialisation and imperialism demanded greater speed and accuracy in person-to-person communications, leading to developments in telegraphy, telephony and the modern postal service. By contrast, we might characterise email in relation to the principles of digitality (i.e. speed, quantity and flexibility). The email process, though not instantaneous, is extremely fast compared to the physical transportation of a letter; so fast, in fact, that it might stand as one of the best examples of the kind of 'space-time compression' often referred to as typical of a **postmodern** communications environment. Distant locations are brought into the same communicative proximity as the office next door.

Additionally the email, because it exists only in digital not analogue form, is subject to multiple transformations and uses. Unlike the handwritten letter it can be multiply re-edited during composition, and the recipient can re-edit the original, interpolating comment and response. The email can be sent to individuals or groups, so the email might be written in any number of registers on a private-public scale. Writing an email to your co-workers will demand a different mode of address from writing an email to your extended friends and family network. A one-to-one email will have a different tone from a group email – in composing we are constantly negotiating different positions on a private-public scale.

This flexibility is enhanced by the possibility of making attachments to the email. These might be anything from another text document to photos, moving image files or music. More or less whatever can be digitised can be attached. Here we see email exemplifying **convergence** of previously discrete media forms.

These qualities have led to a massive increase in the quantity of communications information processed via the PC. There is a net increase in communicative actions, a perceived increase in productivity for organisations, and arguably an increase in social and familial communicative traffic (among what we have to remember is still a global minority with domestic online access). At the level of administration and management this use of email represents an intensification of the paper-based form of the memo. However, this increase in traffic creates new problems of data storage and management; the sheer volume of email received by organisational workers creates 'information overload'. 'No email days' have become a feature of corporate life as managers have come to understand that constant message checking is the enemy of concentration (see Wakefield 2007).

These changes have a number of qualitative implications. For instance, whereas the postal letter has evolved a whole series of formal codes and conventions in modes of address (inscribed as core topics within British schools' National Curriculum) the new forms of digital text communication have evolved a whole set of far less formal conventions:

Thoughts tend toward the experiential idea, the quip, the global perspective, the interdisciplinary thesis, the uninhibited, often

emotional response. I Way [Internet] thought is modular, non-linear, malleable and co-operative. Many participants prefer internet writing to book writing as it is conversational, frank and communicative rather than precise and over written.

(Kevin Kelly, editor, *Wired* magazine in 'Guardian Online', 20 June 1994)

However, the responses prompted by the instantaneous availability of the reply button are not always so positive – hence the Internet-based practice of '**flaming**' – argumentative, hostile and insulting exchanges which can accelerate rapidly in a spiral of mutual recrimination. It is precisely the absence of the face-to-face exchange that leads to communication that can become dangerous. The carefully crafted diplomatically composed memo gives way to the collectively composed, often acrimonious, email debate.

With this kind of history in mind we can see how a consideration of even the banal case of email might give rise to a number of central critical questions:

- 1 Where does control over **authorship** lie when the email text can be multiply amended and forwarded?
- 2 What kind of authority should we accord the electronic letter? Why do we still insist on hard copy for contractual or legal purposes?
- 3 What are the possible consequences of an interpersonal communication system based increasingly not on face-to-face interaction but on anonymous, instant, interaction?

In attempting to answer such questions we might have recourse to different kinds of analytic contexts. First of all an understanding of the cultural history and form of the letter itself. Second, an understanding of the convergence of discrete media forms through the process of digitisation. Third, an attempt to assess those shifts through already existing analyses of culture – in this case theories of authorship and reading. Finally, the questions above would have to be answered with reference to the study of CMC (Computer Mediated Communications) in which the problem of the disappearance of face-to-face communication has been central.

world that has always been at the centre of media processing. For consumers worldwide, differences of wealth and poverty which underpin their highly differential access to other goods, services and technologies apply equally to digital media. The digital principle does not escape the demands of physics or the economic principles of scarcity.

For a brief history of email see: <http://www.livinginternet.com/e/ei.htm>

1.2.2 Interactivity

Since the early 1990s, the term 'interactivity' has been much debated and has undergone frequent redefinition. Most commentators have agreed that it is a concept that requires further definition if it is to have any analytical purchase (see e.g. Downes and McMillan 2000; Jensen 1999; Schultz 2000; Huhtamo 2000; Aarseth 1997; Manovich 2001: 49–61). Subsequently there have been several main attempts to do so which we discuss below and in **Case Study 1.3**. The concept also carries a strong ideological charge: as Aarseth (1997: 48) observed, 'To declare a system interactive is to endorse it with a magic power.'

Case study 1.3 What is new about interactivity?

At the ideological level, interactivity has been one of the key 'value added' characteristics of new media. Where 'old' media offered passive consumption new media offer interactivity. Generally, the term stands for a more powerful sense of user engagement with media texts, a more independent relation to sources of knowledge, individualised media use, and greater user choice. Such ideas about the value of 'interactivity' have clearly drawn upon the popular discourse of neo-liberalism (see **3.7**) which treats the user as, above all, a consumer. Neo-liberal societies aim to commodify all kinds of experience and offer more and more finely tuned degrees of choice to the consumer. People are seen as being able to make individualised lifestyle choices from a never-ending array of possibilities offered by the market. This

3.4 Political economy

For full discussions of the problems of defining interactivity see Jens F. Jensen's 'Interactivity – tracking a new concept in media and communication studies', in Paul Mayer (ed.) *Computer Media and Communication*, Oxford: Oxford University Press, (1999), which offers a comprehensive review of theoretical approaches, and E. Downes and S. McMillan, 'Defining Interactivity', *New Media and Society* 2.2 (2000): 157–179 for a qualitative ethnographic account of the difficulties of applying theoretical definitions in practice; and Lisbet Klastrup (2003) *Paradigms of interaction conceptions and misconceptions of the field today* (<http://www.dichtung-digital.com/2003/issue/4/klastrup/>) for a provocative study of the term's slipperiness

1.2.3 Hypertextual

1.2.5 Virtual

2.1–2.6 What happened to Virtual Reality; The virtual and visual culture; The digital virtual; Immersion: a history; Perspective, camera, software; Virtual images/Images of the virtual

ideological context then feeds into the way we think about the idea of interactivity in digital media. It is seen as a method for maximising consumer choice in relation to media texts.

However, in this section we are mainly concerned with the instrumental level of meanings carried by the term 'interactive'. In this context, being interactive signifies the users' (the individual members of the new media 'audience') ability to directly intervene in and change the images and texts that they access. So the audience for new media becomes a 'user' rather than the 'viewer' of visual culture, film and TV or a 'reader' of literature. In interactive multimedia texts there is a sense in which it is necessary for the user to actively intervene; to act as well as viewing or reading in order to produce meaning. This intervention actually subsumes other modes of engagement such as 'playing', 'experimenting', and 'exploring' under the idea of interaction. Hinting at the connection between instrumental definitions and ideological meanings, Rosanne Allucquere Stone suggests that the wide field of possibility suggested by the idea of interactivity has been 'electronically instantiated . . . in a form most suitable for commercial development – the user moves the cursor to the appropriate place and clicks the mouse, which causes something to happen' (Stone 1995: 8). We can break down this pragmatic account of interactivity further.

Hypertextual navigation

Here the user must use the computer apparatus and software to make reading choices in a database. (We are using the term 'database' in a general rather than specifically technical sense – a database is any collection of memory stored information, text, image, sound, etc.) In principle, this database could be anything from the entire World Wide Web to a particular learning package, an adventure game, or the hard drive on your own PC. The end results of such interactions will be that the user constructs for him or herself an individualised text made up from all the segments of text which they call up through their navigation process. The larger the database the greater the chance that each user will experience a unique text **(1.2.3)**.

Immersive navigation

In the early 1990s Peter Lunenfeld (1993) usefully distinguished between two paradigms of interaction, which he called the 'extractive' and the 'immersive'. Hypertextual navigation (above) is 'extractive'. However, when we move from seeking to gain access to data and information to navigating representations of space or simulated 3D worlds we move into 'immersive' interaction. In some sense both kinds of interaction rely upon the same technological fact – the existence of a very large database which the user is called upon to experience. At one level, a more or less realistically rendered 3D space like the game world of 'Halo 3' or 'Grand Theft Auto IV' is just as much a big database as Microsoft's 'Encarta' encyclopaedia. We might say that the navigation of immersive media environments is similar to hypertextual navigation, but with additional qualities **(1.2.5, 2.1–2.6)**.

When interacting in immersive environments the user's goals and the representational qualities of the media text are different. Immersive interaction occurs on a spectrum from 3D worlds represented on single screens through to the 3D spaces and simulations of virtual reality technologies. Although the point-and-click interactivity of hypertextual navigation may well be encountered in such texts, immersive interaction will also include the potential to explore and navigate in visually represented screen spaces. Here the purpose of interaction is likely to be different from the extractive paradigm. Instead of a text-based experience aimed at finding and connecting bits of information, the goals of the immersed user will include the visual and sensory pleasures of spatial exploration.

Registrational interactivity

Registrational interactivity refers to the opportunities that new media texts afford their users to 'write back into' the text; that is to say, to add to the text by registering their own messages. The base line of this kind of interactivity is the simple activity of registration (i.e. sending off details of contact information to a website, answering questions prompted in online transactions, or typing in a credit card number). However, it extends to any opportunity that the user has to input to a text. The original Internet bulletin boards and newsgroups were a good example – not interactive in the sense of face-to-face communication, yet clearly built up by successive inputs of users' comments. This 'input' or 'writing back' then becomes part of the text and may be made available to other users of the database.

Interactive communications

As we have seen in our case study of email (**Case study 1.2**), computer-mediated communications (CMC) have offered unprecedented opportunities for making connections between individuals, within organisations, and between individuals and organisations.

Much of this connectivity will be of the registrational interactivity mode (defined above) where individuals add to, change, or synthesise the texts received from others. However, when email and chat sites are considered from the point of view of human communication, ideas about the degree of reciprocity between participants in an exchange are brought into play. So, from a Communication Studies point of view, degrees of interactivity are further broken down on the basis of the kinds of communication that occur within CMC. Communicative behaviours are classified according to their similarity to, or difference from, face-to-face dialogue, which is frequently taken as the exemplary communicative situation which all forms of 'mediated' communication have to emulate. On this basis, the question and response pattern of a bulletin board or online forum, for instance, would be seen as less interactive than the free-flowing conversation of a chat site. This inflects the whole idea of interactivity by lending it a context of person-to-person connection.

Interactivity and problems of textual interpretation

Interactivity multiplies the traditional problems about how texts are interpreted by their readers. By the problem of interpretation we refer to the idea that the meaning of any given text is not securely encoded for all audiences to decode in the same way. This is based upon the recognition that the meanings of a text will vary according to the nature of its audiences and circumstances of reception. We all already have highly active interpretative relationships with the analogue (or linear) texts we encounter, such as books and movies. Under conditions of interactivity this problem does not disappear but is multiplied exponentially. This is because the producer of an interactive text or navigable database never knows for certain which of the many versions of the text their reader will encounter. For critics this has raised the essential question of how to evaluate or even conceptualise a 'text' that never reads the same way twice. For producers it raises essential problems of control and authorship. How do they make a text for a reader knowing that they have very many possible pathways through it?

What is the interactive text?

Established ways of thinking about how meaning is produced between readers and texts assumed a stability of the text but a fluidity of interpretation. Under conditions of interactivity this traditional stability of the text has also become fluid. Hence as critics we find ourselves having to reconceptualise the status of our own interpretations of the interactive text. From a theoretical point of view the traditional semiotic tools used for analysis of texts become

Case study 1.2 Email: the problem of the digital letter

See Lev Manovich 'What New Media is Not', *The Language of New Media*, Cambridge, Mass.: MIT Press (2001), pp. 49–61 and Espen Aarseth, 'We All Want to Change the World: the ideology of innovation in digital media', *Digital Media Revisited* (eds T. Rasmussen, G. Liestol and A. Morrison), Cambridge, Mass.: MIT Press (2002). Both authors argue that we have always had an 'interactive' relationship with texts of all kinds because of our individual interpretative relationships with them and that therefore 'interactivity' is a redundant term

inadequate. Aarseth observed in his seminal study of the problem in *Cybertext*: '[t]he new [interactive digital media] consist of "interactive dynamic" elements, a fact that renders traditional semiotic models and terminology, which were developed for objects that are mostly static, useless in their present unmodified form' (Aarseth 1997: 26). Instead of the traditional text/user relations the many kinds of interactivity now available have suggested the need to think of the user as a component in cybernetic circuit of machine, text and body:

Cybertext . . . is the wide range (or perspective) of possible textualities seen as a typology of machines, as various kinds of literary communication systems where the functional differences among the mechanical parts play a defining role in determining the aesthetic process . . . cybertext shifts the focus from the traditional threesome of author/sender, text/message, and reader/receiver to the cybernetic intercourse between the various participant(s) in the textual machine.

(Aarseth 1997: 22)

Understandings of the role of the body in this circuit have become increasingly frequent following Marie-Laure Ryan's (2001) work calling for a phenomenology that analyses 'the sense of "presence" through which the user feels corporeally connected to the virtual world' (2001: 14). These approaches are particularly appropriate where the interactive pleasures on offer are primarily kinaesthetic rather than cognitive as in the case of the immersive interactions offered by computer games for example. As Dovey and Kennedy (2006: 106) argued, 'The idea of a disembodied spectator/viewer/reader is a fictional subject created by particular ways of conceptualising the relationship between "texts" and "readers". This fiction is founded on the Cartesian model of perception whereby consciousness is seen as separate to and distinct from embodiment.'

The cybernetic quality of interactions afforded by digital textualities has led some commentators (see Aarseth 2001, Eskelinen 2001 and Moulthrop 2004) to adopt the use of the term 'configuration' in preference to 'interaction'. This term carries the double force of its derivation from Actor Network Theory inflected study of technological design (Woolgar 1991) and its more colloquial meaning of the ways in which we are all called upon to individually 'configure' or simply 'set up' our own technological environments. In his study of usability trials Woolgar defines configuration as designers' attempts to 'define, enable, and constrain' the user, through the design of an object which will 'define and delimit' the user's possible behaviours. In this sense technologies 'configure' us, affording particular kinds of behavioural patterns. So whereas the term 'interaction' implies a two-way communication, 'configuration' suggests a two-way, mutually constitutive process through which both user and software are dynamically engaged in refashioning one another in a feedback loop. Moulthrop argues that understanding computer gameplay helps to explain how we are all increasingly called upon to have configurative relationships with our media environments:

Games – computer games in particular – appeal because they are configurative, offering the chance to manipulate complex systems within continuous loops of intervention, observation, and response. Interest in such activities grows as more people exchange email, surf the world wide web, post to newsgroups, build web logs, engage in chat and instant messaging, and trade media files through peer-to-peer networks. As in various sorts of gaming, these are all in some degree configurative practices, involving manipulation of dynamic systems that develop in unpredictable or emergent ways.

(Moulthrop 2004: 64)

His argument makes a similar claim to the neo-Frankfurt School position on ‘interaction’ (see **Case study 1.3**) that ‘configuration’ is a necessarily active way for us to understand not just software systems but also political and cultural systems:

If we conceive of configuration as a way of engaging not just immediate game elements, but also the game’s social and material conditions – and by extension, the conditions of other rule-systems such as work and citizenship – then it may be very important to insist upon the difference between play and interpretation, the better to resist immersion.

(2004: 66)

Problems for producers

If new media products pose new questions about textuality they also demand different relationships between producers and users. How do you design an interface that offers navigational choice but at the same time delivers a coherent experience? These problems will of course vary from one text to another. For instance, a website with many embedded links to other sites will offer users many opportunities to take different pathways. The reader/user is quite likely to click onto another site whilst only halfway through your own. On the other hand, within a downloaded interactive learning package, or one that runs off a discrete memory drive (i.e. CD-ROM/DVD) where there is a finite database, the user can be far more easily ‘guided’ in their navigation of pathways that the producers are able to pre-structure. This has meant that producers of interactive texts have gradually come to understand that they need to have collaborative and co-creative relationship with their audiences (see **3.22–3.23**). The digital media text (e.g. website, game, social network), is an *environment* supporting a range of user activities that emerge within the perimeters of the software. Producers therefore need, in Woolgar’s terms, to ‘configure’ the user, to have some idea of the kinds of behaviours that they want their environment to afford, whilst simultaneously understanding that they can neither wholly predict nor control what users will do within it.

These rich forms of interaction therefore have a number of consequences for producers:

- they create the possibility for traditional media producers to collaborate with audiences by finding ways to incorporate ‘user-generated content’ in their corporate projects e.g. newspapers ‘crowdsourcing’ stories (see **3.21**)
- they also redefine the producer not as author but as ‘experience designer’. Authors produced texts that readers interpreted. Interactive media designers are increasingly experience designers, creating open media spaces within which users find their own pathways (e.g. *The Sims* or *Second Life*)
- audiences’ expectations of an interactive experience with a mediated world create the conditions for transmedial production in which for instance a TV programme can be repurposed across a range of platforms, a website with chat/forum capability, a box set DVD with additional material, a computer game etc.

1.2.3 Hypertextual

There are clear links between the navigational, explorative, and configurative aspects of interactivity and hypertextuality. Also, like interactivity, hypertextuality has ideological overtones and is another key term that has been used to mark off the novelty of new media from analogue media. Apart from its reference to non-sequential connections between all kinds of data

facilitated by the computer, in the early 1990s the pursuit of literary hypertexts as novels and forms of non-linear fiction was much in evidence, becoming something of an artistic movement. Such literary hypertexts also attracted much attention from critics and theorists. This work now looks something like a transitional moment produced by the meeting between literary studies and new media potential. However, hypertext and hypertextuality remain an important part of the history of computing, particularly in the way they address ideas about the relationship of computer operating systems, software and databases, to the operation of the human mind, cognitive processes and learning.

Histories

The prefix 'hyper' is derived from the Greek 'above, beyond, or outside'. Hence, hypertext has come to describe a text which provides a network of links to other texts that are 'outside, above and beyond' itself. Hypertext, both as a practice and an object of study, has a dual history.

One history ties the term into academic literary and representational theory. Here there has long been an interest in the way any particular literary work (or image) draws upon or refers out to the content of others, the process referred to as intertextuality. This places any text as comprehensible only within a web of association that is at once 'above, beyond or outside' the text itself. At another level, the conventional means of footnoting, indexing, and providing glossaries and bibliographies – in other words the navigational apparatus of the book – can be seen as antecedents of hypertexts, again guiding the reader beyond the immediate text to necessary contextualising information.

The other history is derived from the language of the computer development industry. Here, any verbal, visual or audio data that has, within itself, links to other data might be referred to as a hypertext. In this sense the strict term 'hypertext' frequently becomes confused with the idea and rhetoric of hypermedia (with its connotations of a kind of super medium which is 'above, beyond, or outside' all other media connecting them all together in a web of convergence).

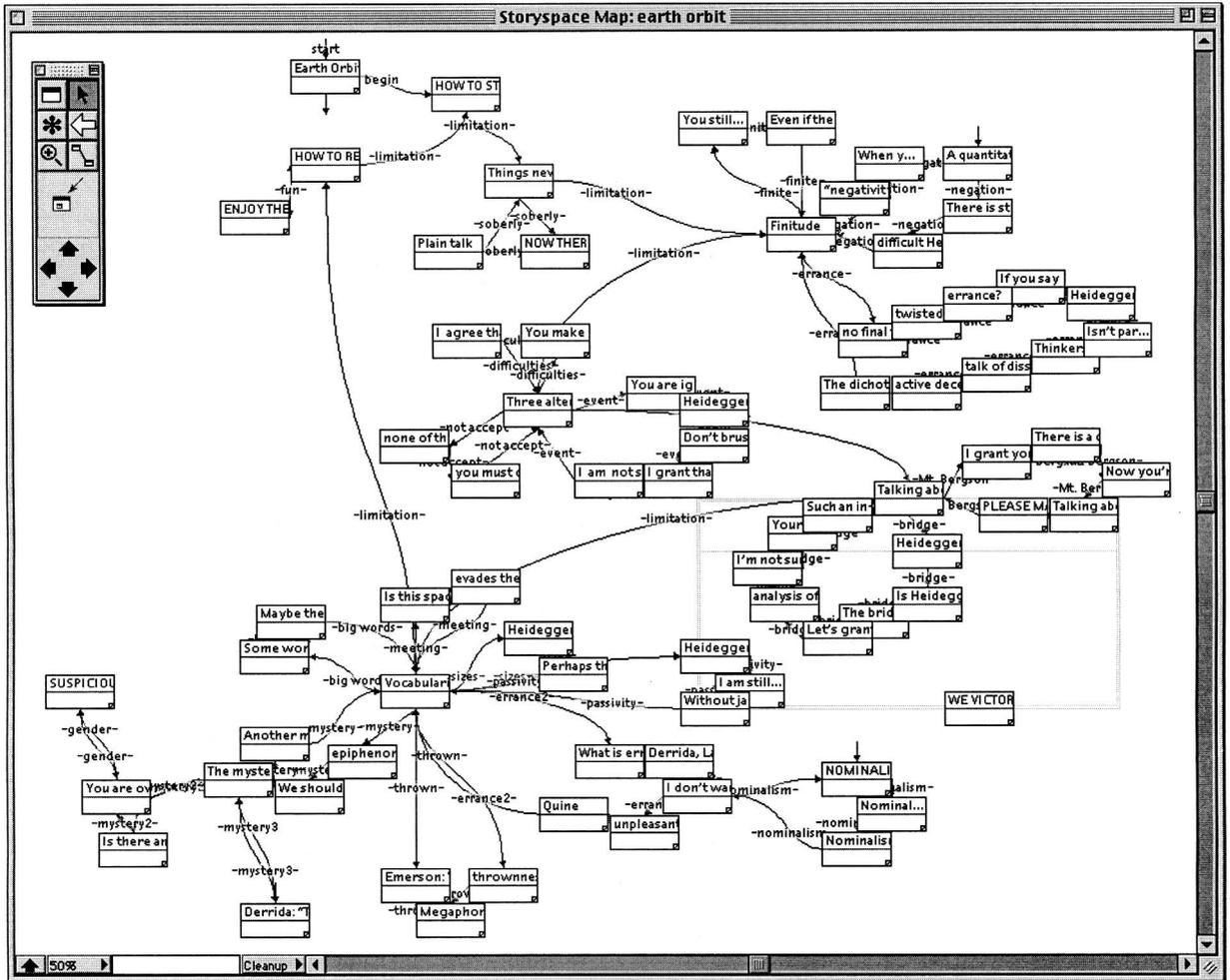
Defining hypertexts

We may define a hypertext as a work which is made up from discrete units of material, each of which carries a number of pathways to other units. The work is a web of connection which the user explores using the navigational aids of the interface design. Each discrete 'node' in the web has a number of entrances and exits or links.

As we have seen (**1.2.1**), in a digitally encoded text any part can be accessed as easily as any other so that we can say that every part of the text can be equidistant from the reader. In an analogue system like traditional video, arriving at a particular frame ten minutes into a tape involved having to spool past every intervening frame. When this information came to be stored digitally this access became more or less instantaneous. Such technology offers the idea that any data location might have a number of instantly accessible links to other locations built into it. Equally the many interventions and manipulations enabled by this facility create the qualities of interactivity (**1.2.2**).

Hypertext and a model of the mind

Vannevar Bush's 1945 essay 'As We May Think' is often seen as a seminal contribution to the idea of hypertext. Bush was motivated by the problem of information overload; the problem of the sheer volume of knowledge that specialists, even in the late 1940s, had to access and manipulate. Bush proposed that science and technology might be applied to the



1.5 Diagram of an early hypertextual architecture – Storyspace Map: earth orbit, www.eastgate.com

management of knowledge in such a way as to produce novel methods for its storage and retrieval. He conceptualised a machine, the 'Memex', in which data could be stored and retrieved by association rather than by the alphabetical and numerical systems of library indices. Bush argued that,

The human mind operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in association with some intricate web of trails carried by the cells of the brain.

(Bush in Mayer 1999: 33)

The data in the Memex would be individually coded according to the associative links that a user found meaningful to his or her own work,

It [the Memex] affords an immediate step . . . to associative indexing, the basic idea of which is a provision whereby any item may be caused at will to select immediately and automatically another . . . The process of tying two items together is the important thing.

(Bush in Mayer 1999: 34)

See Pierre Lévy, *Collective Intelligence: Mankind's Emerging World in Cyberspace*, Cambridge: Perseus (1997) and D. Tapscott and A. Williams, *Wikinomics: How Mass Collaboration Changes Everything*, London: Penguin Books (2006) for the ways in which these utopian aspirations have been absorbed into business practice

Bush's argument from 1945 carries within it many of the important ideas that have subsequently informed the technology and practice of hypertext. In particular his position rests upon the assertion that associative linkage of data is a more 'natural' model of information management than the conventional linear alphabetical methods of bibliography such as the Dewey library system. Associative linkage, argues Bush, replicates more accurately the way the mind works. The continuing appeal of hypertext as both information storage and creative methodology has been that it appears to offer a better model of consciousness than linear storage systems. We can observe this appeal continuing in speculation about the development of a global 'neural net' that follows on from Nelson's arguments below. These ideas also resurface in a different form in the arguments of Pierre Lévy calling for a global 'collective intelligence' and in the daily practice of using a site like Wikipedia. Such an enterprise appears in many ways to conform to the idea that knowledge can be produced through associative rather than linear linkage and that, moreover, this knowledge can be collectively authored.

Hypertext as non-sequential writing

The microfiche technologies of the postwar period were unable to create Bush's vision. However, twenty years later, as digital computing began to be more widespread, his ideas were revived, most notably by Ted Nelson. His 1982 paper 'A New Home for the Mind' argues for the wholesale reorganisation of knowledge along hypertextual lines:

This simple facility – call it the jump-link capability – leads immediately to all sorts of new text forms: for scholarship, for teaching, for fiction, for poetry . . . The link facility gives us much more than the attachment of mere odds and ends. It permits fully non sequential writing. Writings have been sequential because pages have been sequential. What is the alternative? Why hypertext – non sequential writing.

(Nelson 1982, in Mayer 1999: 121)

However, Nelson does not stop at the idea of non-sequential writing, he also foresees, ten years before browser software made Internet navigation a non-specialist activity, a medium very close to contemporary website forms of the Internet. In this medium 'documents window and link freely to one another', 'every quotation may be traced instantly', and 'minority interpretations and commentary may be found everywhere'. He envisages

a hyperworld – a new realm of published text and graphics, all available instantly; a grand library that anybody can store anything in – and get a royalty for – with links, alternate visions, and backtrack available as options to anyone who wishes to publish them.

(Nelson 1982, in Mayer 1999: 124)

So, the postwar challenge of managing information overload, a model of the mind as a web of trails and associations, and a concept of non-linear writing then extended to a freely accessible 'grand library' of all kinds of media, finally lead us to the concept of hypermedia. Nelson's vision of the potential of hypertext opens out to encompass an emancipatory configuration of human knowledge based in accessibility and manipulation through associative links.

Hypermediacy

More recently the very specific application of hypertext as an information management principle expanded to suggest all kinds of non-linear, networked paradigms. Here the term began to overlap with the idea of hypermediacy. The ideological investment in the idea of hypertext spills over into use of the term 'hypermedia' to describe the effects of hypertextual methods of organisation on all mediated forms. By the end of the 1990s, hypermediacy emerged as an important term in a theory of new media:

the logic of hypermediacy acknowledges multiple acts of representation and makes them visible. Where immediacy suggests a unified visual space, contemporary hypermediacy offers a heterogeneous space, in which representation is conceived of not as a window on the world, but rather as 'windowed' itself – with windows that open on to other representations or other media. The logic of hypermediacy multiplies the signs of mediation and in this way tries to reproduce the rich sensorium of human experience.

(Bolter and Grusin 1999: 33–34)

Reproducing the 'rich sensorium of human experience' is the kind of claim that recalls Marshall McLuhan's view that media should be understood as extensions of the human body (1.6.2). As we have seen, it is a claim that that was present in the original formulations of ideas of hypertextuality – the assumptions about cognition in Vannevar Bush and Ted Nelson here become a principle in which hypermedia are valorised as somehow representing the ultimate augmentation of human consciousness.

1.6.2 Mapping Marshall
McLuhan

From the library to Google – critical questions in hypertext

Much of the debate arising from the application of hypertext overlapped with discussions about the consequences of interactivity. However, debates about the issues and questions arising from hypertext practices have been conducted with reference to literary theory while questions of interactivity tended to reference human computer interface studies and communication studies.

Clearly, considerations of interactivity and hypertext share a concern with the status and nature of the text itself. What happens when conventional ways of thinking about the text derived from literature or media studies are applied to texts that, allegedly, work in entirely new ways? If the existing structures of knowledge are built upon the book, what happens when the book is replaced by the computer memory and hypertextual linking?

Since the Middle Ages human knowledge and culture has been written, recorded and in some sense produced by the form of the book (see, for example, Ong 2002; Chartier 1994). The printed word has established an entire taxonomy and classification system for the management and production of knowledge (e.g. contents, indices, reference systems, library systems, citation methods, etc.). It is argued that this literary apparatus of knowledge is defined around sequential reading and writing. When we write, we order our material into a linear sequence in which one item leads into another within recognised rhetorical terms of, for example, argument, narrative or observation. Similarly the reader follows, by and large, the sequencing established by the author. Now, it was argued, hypertext offered the possibility of non-sequential reading and writing. There is no single order in which a text must be encountered.

Each 'node' of text carries within it variable numbers of links that take the reader to different successive nodes, and so on. Thus the reader is offered a 'non-linear' or, perhaps more accurately, a 'multilinear' experience. (Following a link is a linear process; however the variable number of links on offer in any given text produce high numbers of possible pathways.)

Knowledge constructed as multilinear rather than monilinear, it is argued, threatens to overturn the organisation and management of knowledge as we have known it to date, since all existing knowledge systems are founded upon the principle of monolinearity.

Thus the very status of the text itself is challenged. The book which you hold in your hand is dissolved into a network of association – within the book itself numerous crosslinkages are made available which facilitate many different reading pathways; and the book itself becomes permeable to other texts. Its references and citations can be made instantly available, and other related arguments or converse viewpoints made available for immediate comparison. In short, the integrity of the book and of book-based knowledge systems is superseded by network knowledge systems. The superstructure of knowledge storage that formed library systems (Dewey classification, indices, paper based catalogues) is replaced by the design of the search engine with its associated systems of metadata, tagging and user-generated taxonomies of knowledge.

The primary literature and debates arising are by now extensive, and have become one of the most important points of contact between European critical theory and American

cyberculture studies.

This section offers a brief introductory overview of the key questions. For further study see, for example, Jay David Bolter, *Writing Space: The Computer, Hypertext and the History of Writing*, New York: Erlbaum (1991); George Landow and Paul Delaney (eds), *Hypermedia and Literary Studies*, Cambridge, Mass.: MIT Press (1991); George Landow, *Hypertext: The Convergence of Contemporary Literary Theory and Technology*, Baltimore and London: Johns Hopkins University Press (1992) (especially pp. 1–34); George Landow (ed.) *Hyper/Text/Theory*, Baltimore and London: Johns Hopkins University Press (1994); Mark Poster, *The Mode of Information*, Cambridge: Polity Press (1990), pp. 99–128

Hypertext scholarship

We can identify two trajectories in the first wave of hypertext scholarship that began to try and understand the significance of these developments.

The first was the return to previously marginal works in the history of literature which had themselves sought to challenge the linearity of text – these often experimental works are then constructed as ‘proto-hypertexts’. So, for instance, works as diverse as the I Ching, Sterne’s *Tristram Shandy*, Joyce’s *Ulysses*, stories by Borges, Calvino, and Robert Coover and literary experiments with the material form of the book by Raymond Queneau and Marc Saporta are all cited as evidence that hypertextual modes of apprehension and composition have always existed as a limit point and challenge to ‘conventional’ literature. For students of other media we might begin to add the montage cinema of Vertov and Eisenstein, experiments with point of view in films like Kurosawa’s *Rashomon* and time in a film like *Groundhog Day* (see, for example, Aarseth 1997: 41–54 and Murray 1997: 27–64). Equally, the montage of Dada, Surrealism and their echoes in the contemporary collage of screen-based visual culture might also be seen as ‘hypermediated’ in Bolter and Grusin’s sense. Here then is another important point at which the history of culture is reformulated by the development of new media forms **(1.4)**.

1.2.4 Networked

During the late 1970s and throughout the 1980s, capitalist economies experienced recurring crises, caused by the rigidity of their centralised production systems. These were crises in the profitability of the mass production of homogeneous commodities for mass consumer markets. In his detailed analysis of a shift from the ‘modern’ to the ‘postmodern’ mode of production, the Marxist cultural geographer David Harvey traced the manner in which these rigidities of centralised ‘fordist’ economies were addressed. Writing in 1989, he noted,

what is most interesting about about the current situation is the way that capitalism is becoming ever more tightly organized *through dispersal*, geographical mobility, and flexible responses in labour markets, labour processes and consumer markets, all accompanied by hefty doses of institutional, product, and *technological innovation* [our emphases]

(Harvey 1989: 159)

These changes were felt in the organisation of media production. In 1985, Françoise Sabbah observed the tendency of the then emerging 'new media' toward decentralisation of production, differentiation of products, and segmentation of consumption or reception:

the new media determine a segmented, differentiated audience that, although massive in terms of numbers, is no longer a mass audience in terms of simultaneity and uniformity of the message it receives. The new media are no longer mass media . . . sending a limited number of messages to a homogeneous mass audience. Because of the multiplicity of messages and sources, the audience itself becomes more selective. The targeted audience tends to choose its messages, so deepening its segmentation . . .

(Sabbah 1985: 219; quoted in Castells 1996: 339)

Now, in the first decade of the twenty-first century, these have become key aspects of our networked and dispersed mediasphere. Over the last twenty-five years or so, the development of decentralised networks has transformed media and communication processes. Indeed, some commentators now argue, we have recently entered a new phase in which these characteristics become even more pronounced. Here, not only are the markets and audiences for media of all kinds de-massified, increasingly specialist and segmented, and involving a blurring of producer and consumer, but whole sectors of the new media industries are learning to see their role as providing the means and opportunities for 'users' to generate their own content. Simultaneously, a new media economics is being recognised, one that does not aim to address large single audiences but instead seeks out the myriad of minority interests and niche markets that the net is able to support (see **3.13**, The Long Tail).

The World Wide Web, corporate intranets, Virtual Learning Environments, MPORPGs, 'persistent worlds', Social Network Sites, blog networks, online forums of all kinds, and humble email distribution lists, are all networks of various scales and complexities that nestle within or weave their way selectively through others. All are ultimately connected in a vast, dense and (almost) global network (the Internet itself) within which an individual may roam, if policed and limited by firewalls, passwords, access rights, available bandwidths and the efficiency of their equipment. This is a network that is no longer necessarily accessed at fixed desktop workstations plugged into terrestrial phone lines or cables, but also wirelessly and on the move, via laptops, PDAs, GPS devices, and mobile phones.

There are intricacies, unforeseen contradictions and social, political, economic and cultural questions that arise with these developments. These issues are more fully discussed in Part 3 of this book. For the moment our task is to see how, in recent history, there has been a shift from media centralisation to dispersal and networking.

Consumption

From our present position we can see that from the 1980s on, our consumption of media texts has been marked by a shift from a limited number of standardised texts, accessed from a few dedicated and fixed positions, to a very large number of highly differentiated texts accessed in multifarious ways. The media audience has fragmented and differentiated as the number of media texts available to us has proliferated. For instance, from an era with a limited number of broadcast TV stations, containing no time-shifting VCRs or DVD players, with very limited use of computers as communication devices and no mobile media at all, we now find ourselves confronted by an unprecedented penetration of media texts into everyday life. 'National' newspapers are produced as geographically specific editions; they can be

For further accounts of the development of an approach to hypertext that goes beyond the post-structuralist paradigm, see especially Aarseth (1997), but also Michael Joyce, *Of Two Minds: hypertext pedagogy and poetics*, Ann Arbor: University of Michigan Press (1995); Stuart Moulthrop, 'Toward a rhetoric of informing texts in hypertext', *Proceedings of the Association for Computing Machinery*, New York (1992), 171–179; M. Rieser and A. Zapp (eds) *New Screen Media: cinema/art/narrative*, London: British Film Institute, 2002; M.-L. Ryan, *Possible Worlds, Artificial Intelligence, and Narrative Theory*, Bloomington and Indianapolis: Indiana University Press, (1991); P. Harrigan and N. Wardrip-Fruin (eds) *First Person, New Media as Story, Performance and Game*, Cambridge, Mass.: MIT Press, (2003.)

interactively accessed, archived online, we can receive 'alerts' to specific contents. Network and terrestrial TV stations are now joined by independent satellite and cable channels. Alongside real-time broadcasts we have TV 'on demand', time shifted, downloaded and interactive. The networked PC in the home offers a vast array of communication and media consumption opportunities; mobile telephony and mobile computing have begun to offer a future in which there are no media free zones, at least in the lives of the populations of the 'developed' world. Technologists are currently conceptualising what a 'pervasive' media environment will be, when all media is available on a variety of wireless platforms and devices.

See e.g.
<http://interactive.usc.edu/research/mobile/>

The 'mass media', which were transformed in this way, were the products of the communication needs of the first half of the twentieth century in the industrialised world and as such they had certain characteristics. They were centralised, content was produced in highly capitalised industrial locations such as newspaper printworks or Hollywood film studios. In broadcast media, press and cinema, distribution was tied to production, film studios owned cinema chains, newspapers owned fleets of distribution vans, the BBC and other national 'broadcasters' owned their own transmission stations and masts. Consumption was characterised by uniformity: cinema audiences all over the world saw the same movie, all readers read the same text in a national newspaper, we all heard the same radio programme. And we did these things at the same scheduled times. Twentieth-century mass media were characterised by standardisation of content, distribution and production process. These tendencies toward centralisation and standardisation in turn reflected and created the possibility for control and regulation of media systems, for professionalisation of communicative and creative processes, for very clear distinctions between consumers and producers, and relatively easy protection of intellectual property.

See Brian Winston, *Media, Technology and Society: a History: from the Telegraph to the Internet*, London and New York: Routledge (1998), pp. 243–275, for a history of broadcast networks.

The centre of a circle

A useful way to conceptualise the difference between centralised and dispersed media distribution systems is to think about the differences between radio and television broadcast *transmissions* and computer media *networks*. The technology at the heart of the original radio and TV broadcast systems is radio wave transmission; here transmission suites required high investment in capital, plant, buildings, masts, etc. Airwave transmission was supplemented by systems of coaxial cable transmission, where massive investments throughout the twentieth century led to the establishment of a global network of cable systems crossing whole continents and oceans. At the core of this technology of transmission there was a central idea, that of transmission from 'one to many': one input signal was relayed to many points of consumption. The radio transmitter, then, works (for social and technological reasons) on a centralised model.

Nodes in a web

In contrast, the computer **server** is the technology at the heart of the dispersed systems of new media. A server, by contrast to a transmission mast, is a multiple input/output device, capable of receiving large amounts of data as input as well as making equally large quantities available for downloading to a PC. The server is a networked device. It has many input connections and many output connections, and exists as a node in a web rather than as the centre of a circle.

A radio transmitter capable of handling broadcast radio and TV signals is an expensive capital investment way beyond the reach of most enterprises or individuals. The server, on the other hand, is relatively cheap, being commonplace in medium or large enterprises of all

kinds. Access to server space is commonly domestically available as part of online subscription packages.

However, this simple opposition between the centralised and the networked prompts questions. Most interestingly, it points up how there is no radical and complete break between 'old' and 'new' media. This is because networked media distribution could not exist without the technological spine provided by existing media routes of transmission, from telephone networks to radio transmission and satellite communications. 'Old' media systems of distribution are not about to disappear, although they become less visible, because they are the essential archaeological infrastructure of new media.

New media networks have been able to reconfigure themselves around this 'old' core to facilitate new kinds of distribution that are not necessarily centrally controlled and directed but are subject to a radically higher degree of audience differentiation and discrimination. Many different users can access many different kinds of media at many different times around the globe using network-based distribution. Consumers and users are increasingly able to customise their own media use to design individualised menus that serve their particular and specific needs.

This market segmentation and fragmentation should not be confused with a general democratisation of the media. As Steemers, Robins and Castells have argued, the multiplication of possible media choices has been accompanied by an intensification of merger activities among media corporations: 'we are not living in a global village, but in customised cottages globally produced and locally distributed' (Castells 1996: 341); (see **3.4–3.10**).

Production

This increased flexibility and informality of our interaction with media texts of all kinds is equally present in the field of media production. Here, too, we have seen the development of production technologies and processes that have challenged the older centralised methods of industrial organisation and mass media production sectors. These changes can be perceived within the professional audiovisual industries as well as within our everyday domestic spheres.

Today, media industries are facing the fact that the conjunction of computer-based communications and existing broadcast technologies has created a wholly new and fluid area of media production. The traditional boundaries and definitions between different media processes are broken down and reconfigured. The specialist craft skills of twentieth-century media production have become more generally dispersed throughout the population as a whole, in the form of a widening baseline of 'computer literacy', information technology skills, and especially the availability of software that increasingly affords the production of 'user-generated content' (see **3.21**).

Across the period, the range of sites for the production of media content has expanded – production has been dispersing itself more thoroughly into the general economy, now frequently dubbed 'the knowledge economy' or the 'information society'. This dispersal of production can also be observed from the perspective of the everyday worlds of work and domesticity. Consider the proximity of media production processes to a twentieth-century citizen. In the UK during the 1970s, for instance, the nineteenth-century media processes of print and photography would probably have been the only kind of media production processes that might be used or discussed in everyday life as part of civic, commercial, cultural or political activity. Broadcasting and publishing systems (the 'press') were mostly very distant from the lives of ordinary people. However, by the end of the century, print production was easier than ever through digitised desktop publishing, and editorial and design technologies were all available in domestic software packages. Photographic production through

An extraordinary but little noticed and eccentric example of this is the use of a subterranean system of conduits designed to provide hydraulically (waterpowered) generated electricity to London households in the 1890s. The conduits were designed to hold water under pressure which powered generators placed at the threshold of each subscribing home. This system, owned until the 1970s by the long defunct 'London Hydraulic Power Company', was purchased by Mercury Telecommunications in 1992. Under Mercury's ownership these conduits originally designed to carry water were used as a means to deliver Internet cable services to those same homes (Gershuny 1992)

See also Jeanette Steemers, 'Broadcasting is dead, long live digital choice', *Convergence* 3.1 (1997) and J. Cornford and K. Robins, 'New media', in J. Stokes and A. Reading (eds) *The Media in Britain*, London: Macmillan (1999)

digital cameras, post-production processes, and distribution through file compression and networks, have transformed domestic photography (see Rubinstein and Sluis 2008). Television production has moved much closer to the viewer in the sense that very many of us 'shoot' digital video which can now be distributed online by, for example, YouTube (see **3.23**). There may be limitations to this self production of media images, although new conventions and forms are also emerging to which the once mainstream media respond reflexively, but, as Castells recognised, it has also modified the older 'one way flow' of images and has 'reintegrated life experience and the screen' (1996: 338).

The integration of media process into everyday life is not confined to the domestic sphere. As work has increasingly moved towards service rather than production economies all kinds of non-media workers find themselves called upon to be familiar with various kinds of media production processes from web design to Powerpoint presentation and computer-mediated communication software. Both at home and at work media production processes are far closer to the rhythms of everyday life. While we certainly would not wish to over-emphasise the degree of this proximity by echoing claims of cyber pioneers for the total collapse of the distinction between consumption and production, it is certainly the case that the distance between the elite process of media production and everyday life is smaller now than at any time in the age of mass media.

Consumption meets production

Across a range of media we have seen the development of a market for 'prosumer' technologies; that is, technologies that are aimed at neither the professional nor the (amateur) consumer market but both – technologies that enable the user to be both consumer and producer. This is true in two senses; the purchaser of a £2,000 digital video camera is clearly a consumer (of the camera), and may use it to record home movies, the traditional domain of the hobbyist consumer. However, they may equally use it to record material of a broadcast quality for a Reality TV show, or to produce an activist anti-capitalist video that could have global distribution or pornographic material that could equally go into its own circuit of distribution. Until the 1990s the technological separation between what was acceptable for public distribution and what was 'only' suitable for domestic exhibition was rigid. The breakdown of the professional/amateur category is a matter ultimately of cost. The rigid distinction between professional and amateur technologies defined by engineering quality and cost has now broken down into an almost infinite continuum from the video captured on a mobile phone to the high-definition camera commanding six-figure prices.

The impact of these developments has been most clearly seen in the music industry. Digital technologies have made possible a dispersal and diffusion of music production that has fundamentally changed the nature of the popular music market. The apparatus of analogue music production, orchestral studios, 20-foot sound desks and 2-inch rolls of tape can all now be collapsed into a sampling keyboard, a couple of effects units, and a computer. The bedroom studio was clearly one of the myths of 'making it' in the 1990s; however, it is not without material foundation. The popular success of dance music in all its myriad global forms is in part the consequence of digital technologies making music production more accessible to a wider range of producers than at any time previously.

The PC itself is in many ways the ultimate figure of media 'prosumer' technology. It is a technology of distribution, of consumption, as well as a technology of production. We use it to look at and listen to other people's media products, as well as to produce our own, from ripping CD compilations to editing videotape, mixing music or publishing websites. This overlap between consumption and production is producing a new networked zone of media

exhibition that is neither 'professionalised' mainstream nor amateur hobbyist. Jenkins argues that

it is clear that new media technologies have profoundly altered the relations between media producers and consumers. Both culture jammers and fans have gained greater visibility as they have deployed the web for community building, intellectual exchange, cultural distribution, and media activism. Some sectors of the media industries have embraced active audiences as an extension of their marketing power, have sought greater feedback from their fans, and have incorporated viewer generated content into their design processes. Other sectors have sought to contain or silence the emerging knowledge culture. The new technologies broke down old barriers between media consumption and media production. The old rhetoric of opposition and cooptation assumed a world where consumers had little direct power to shape media content and where there were enormous barriers to entry into the marketplace, whereas the new digital environment expands their power to archive, annotate, appropriate, and recirculate media products.

(Jenkins 2002: see **3.21**)

In the media industries the craft bases and apprenticeship systems that maintained quality and protected jobs have broken down more or less completely, so that the question of how anyone becomes 'qualified' to be a media producer is more a matter of creating a track record and portfolio for yourself than following any pre-established routes. This crisis is also reflected in media education. Here, some argue for a pressing need for a new vocationalism aimed at producing graduates skilled in networking and the production of intellectual and creative properties. Others argue that, in the light of the new developments outlined above, media studies should be seen as a central component of a new humanities, in which media interpretation and production are a core skillset for all kinds of professional employment. Yet others argue for a 'Media Studies 2.0' which would break with the traditional media studies emphasis on 'old' broadcasting models and would embrace the new skills and creativity of a 'YouTube' generation (see Gauntlett 2007, Merrin 2008).

In summary, new media are networked in comparison to mass media – networked at the level of consumption where we have seen a multiplication, segmentation and resultant individuation of media use; dispersed at the level of production where we have witnessed the multiplication of the sites for production of media texts and a greater diffusion within the economy as a whole than was previously the case. Finally, new media can be seen as networked rather than mass for the way in which consumers can now more easily extend their participation in media from active interpretation to actual production.

1.2.5 Virtual

Virtual worlds, spaces, objects, environments, realities, selves and identities, abound in discourses about new media. Indeed, in many of their applications, new media technologies produce virtualities. While the term 'virtual' (especially 'virtual reality') is readily and frequently used with respect to our experience of new digital media it is a difficult and complex term. In this section we make some initial sense of the term as a characteristic feature of new media. A fuller discussion and history will be found in Part 2 (**2.1–2.6**). In terms of new digital media we can identify a number of ways in which the virtual is used.

First, throughout the 1990s, the popular icon of 'virtual reality' was not an image of such

a reality itself but of a person experiencing it and the apparatus that produced it. This is the image of a head-set wearing, crouching and contorted figure perceiving a computer-generated 'world' while their body, augmented by helmets carrying stereoscopic LCD screens, a device that monitors the direction of their gaze, and wired gloves or body suits providing tactile and positioning feedback, moves in physical space.

Equally powerful have been a series of movies, cinematic representations of virtual reality, from the early 1980s onwards, in which the action and narrative takes place in a simulated, computer generated world (*Tron*: 1982, *Videodrome*: 1983, *Lawnmower Man*: 1992, *The Matrix*: 1999, *eXistenZ*: 1999).

The 'virtual reality' experienced by the wearer of the apparatus is produced by **immersion** in an environment constructed with computer graphics and digital video with which the 'user' has some degree of interaction. The movies imagine a condition where human subjects inhabit a virtual world which is mistaken for, or has replaced, a 'real' and physical one.

Second, alongside these immersive and spectacular forms of virtual reality, another influential use of the term refers to the space where participants in forms of online communication feel themselves to be. This is a space famously described as 'where you are when you're talking on the telephone' (Rucker *et al.* 1993: 78). Or, more carefully, as a space which 'comes into being when you are on the phone: not exactly where you happen to be sitting, nor where the other person is, but somewhere in between' (Mirzoeff 1999: 91).

As well as these uses, the 'virtual' is frequently cited as a feature of postmodern cultures and technologically advanced societies in which so many aspects of everyday experience are technologically simulated. This is an argument about the state of media culture, postmodern identity, art, entertainment, consumer and visual culture; a world in which we visit virtual shops and banks, hold virtual meetings, have virtual sex, and where screen-based 3D worlds are explored or navigated by videogame players, technicians, pilots, surgeons etc.

Increasingly we also find the term being used retrospectively. We have already noted the case of the telephone, but also the experience of watching film and television, reading books and texts, or contemplating photographs and paintings are being retrospectively described as virtual realities (see Morse 1998; Heim 1993: 110; Laurel in Coyle 1993: 150; Mirzoeff 1999: 92–99). These retrospective uses of the term can be understood in two ways: either as a case of the emergence of new phenomena casting older ones in a new light (Chesher 1997: 91) or that, once it is looked for, experience of the 'virtual' is found to have a long history (Mirzoeff 1999: 91 and Shields 2003).

As Shields has pointed out (2003: 46) in the digital era the meaning of 'virtual' has changed. Where, in everyday usage, it once meant a state that was 'almost' or 'as good as' reality, it has now come to mean or be synonymous with 'simulated' (see **1.2.6**). In this sense, rather than meaning an 'incomplete form of reality' it now suggests an alternative to the real and, maybe, 'better than the real' (46). However, some older meanings of 'virtual' still find echoes in modern usage. One of these is the connection between the virtual and the 'liminal' in an anthropological sense, where the liminal is a borderline or threshold between different states such as the carnivals or coming of age rituals held in traditional societies. Such rituals are usually marked by a period in which the normal social order is suspended for the subject who is passing from one status or position to another. The more recent interest in virtual spaces as spaces of identity performance or places where different roles can be played out appears continuous with older liminal zones (Shields 2003: 12).

The rise of the digital virtual (the virtual as simulation and as an alternative reality) has also

See <http://www.cyberpunkreview.com/virtual-reality-movies/> for a full list of movies about VR

3.17–3.20
5.4 Theories of
cyberculture

For a view which challenges the idea that the Internet is a space, or should be thought of as a space at all, see Chesher (1997: 91)

The experience of acting remotely via robotics on a simulation can more accurately be described as telepresence. While telepresence is often subsumed as a kind of VR, see Ken Goldberg, 'Virtual reality in the age of telepresence', *Convergence* 4.1 (1998) for a fuller discussion of the difference

led to interest in philosophical accounts of the virtual. Here, particularly in the thought of the philosopher Gilles Deleuze, we are urged to see that the virtual is not the opposite of the real but is itself a kind of reality and is properly opposed to what is ‘actually’ real. This is an important argument as, in a world in which so much is virtual, we are saved from concluding that this is tantamount to living in some kind of un-real and immaterial fantasy world. In networked, technologically intensive societies we increasingly pass between actual and virtual realities; in such societies we deal seamlessly with these differing modes of reality (see **3.20**).

There is a common quality to the two kinds of virtual reality with which we started above (that produced by technological immersion and computer generated imagery and that imagined space generated by online communications). This is the way that they give rise to puzzling relationships between new media technologies and our experiences and conceptions of space, of **embodiment** (literally: of having and being conscious of having bodies) and identity (see **4.4**). The generic concept which has subsumed both kinds of virtual reality has been ‘cyberspace’. It is now arguable that the widespread and deep integration of new technologies into everyday life and work means that the concept of ‘cyberspace’ (as an other space to ‘real’ physical space) is losing its force and usefulness. Nevertheless, the promise of a fusion of these two kinds of virtual reality – the sensory plenitude of immersive VR and the connectivity of online communication – has been an important theme in the new media imaginary (see **1.5.2**) because, in such a scenario, full sensory immersion would be combined with extreme bodily remoteness.

The middle term, the ground for anticipating such a fusion of the two VRs, is the digital simulation of ‘high resolution images of the human body in cyberspace’ (see Stone 1994: 85). The empirical grounds for venturing such a claim are seen in the form of virtual actors or synthespians (computer simulations of actors) that appear in cinema, TV, and videogames. However, the computing power and the telecommunications bandwidth necessary to produce, transmit and refresh simulations of human beings and their environments, let alone the programming that would enable them to interact with one another in real time, remains a technological challenge. Instead we find the body digitally represented in a host of different ways. In popular culture for instance we see increasing hybridisation of the human body in performance as real actors create the data for a performance which is finally realised in CGI form through various techniques of motion capture. In the realm of MMORPGs we see the body of the user represented through avatars that are the subject of intense and intricate work by their users.

If we were to understand these digitisations of the body as partial realisations of the fully immersive 3-D Avatar, interesting questions arise. Where does the desire for such developments lie? And, what goals or purposes might attract the financial investment necessary for such technological developments? In thinking about these developments, their desirability and purpose, we have to take into account the **technological imaginary (1.5.2)** which so powerfully shapes thinking about new media of all kinds. We are also reminded of the part played by science fiction in providing us with ideas and images with which to think about cyberspace and the virtual. Writing in the mid-1990s, Stone (1994: 84), suggested that when the first ‘virtual reality’ environments came online they would be realisations of William Gibson’s famous definition of cyberspace, in his novel *Neuromancer*, as a ‘consensual hallucination’. The current examples of persistent online worlds such as ‘*Second Life*’ or games like *World of Warcraft* mark the current stage of this vision and project.

The way in which media history is more generally recast in the light of present preoccupations is discussed in 1.4, What kind of history?

Related to this interest in virtual reality, a more general quality or mode of existence, ‘the virtual’, has seen revived interest. The concept has a long history in philosophy and theology (see Pierre Lévy, *Becoming Virtual: Reality in the Digital Age*, New York: Perseus, 1998). See also R. Shields, *The Virtual*, London and New York: Routledge (2003), and **5.4.2**

1.5.2 The technological imaginary

See also: **2.1** What happened to Virtual Reality?

William Gibson, in *Neuromancer* (1986: 52), describes cyberspace as 'a consensual hallucination experienced daily by billions of legitimate operators in every nation . . . a graphic representation of data abstracted from the banks of every computer in every human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights receding.' This has become the standard science fictional basis for imagining cyberspace as an architectural (Cartesian) space, in which 'a man may be seen, and perhaps touched as a woman and vice versa – or as anything else. There is talk of renting pre-packaged body forms complete with voice and touch . . . multiple personality as commodity fetish!' (Stone 1994: 85)

This is very clear as regards the functional character of VR, which we discuss in 2.1–2.6 below

1.2.6 Simulated

We saw in the previous section that uses of the concept 'virtual' have, in a digital culture, close relationships with 'simulation'. Simulation is a widely and loosely used concept in the new media literature, but is seldom defined. It often simply takes the place of more established concepts such as 'imitation' or 'representation'. However where the concept is paid more attention, it has a dramatic effect on how we theorise cultural technologies such as VR (2.1–2.6) and cinema (2.7). For the moment, it is important to set out how the term has been used in order to make the concept of simulation, and how we will subsequently use it, clear.

Looser current uses of the term are immediately evident, even in new media studies, where it tends to carry more general connotations of the illusory, the false, the artificial, so that a simulation is cast as an insubstantial or hollow copy of something original or authentic. It is important to invert these assumptions. A simulation is certainly artificial, synthetic and fabricated, but it is not 'false' or 'illusory'. Processes of fabrication, synthesis and artifice are real and all produce new real objects. A videogame world does not necessarily imitate an original space or existing creatures, but it exists. Since not all simulations are imitations, it becomes much easier to see simulations as things, rather than as representations of things. The *content* of simulations may of course (and frequently does) derive from 'representations'. This is what lies at the core of Umberto Eco's analysis of Disneyland for instance: the houses in Disneyland's version of an ideal American Main Street are fakes, deceits, they look something like real houses yet are something quite different (in this case supermarkets or gift shops) (Eco 1986: 43). But noticing a gap between the representational content of a simulation (shops, space invaders) and its architectural or mechanical workings should not lead us to discount and ignore the latter. The simulation exists regardless of whether we are fooled by its content or not. Thus the problem to which simulation draws our attention is not that of the difference between 'simulated' and 'real' content, but rather that of the material and real existence of simulations as part of the furniture of the same real world that has been so thoroughly 'represented' throughout the history of the arts and media. In other words a simulation is real *before* it imitates or represents anything.

For the present, however, as things stand in new media studies, not only is there no agreement that simulation does in fact differ from representation or imitation, but the simple profusion of answers to the question of what simulation really is and how, or if it differs at all from representation or imitation, has led many commentators to give up seeking any specificity to the concept and to concede that

[t]he distinction between simulation and imitation is a difficult and not altogether clear one. Nevertheless, it is vitally important. It lies at the heart of virtual reality.

(Woolley 1992: 44)

Yet if the concept is, as Woolley here notes, 'vitally important', it surely becomes all the more important to seek some clarity. We should then examine the ways in which the term is in use with regard to the analysis of new media. There are three very broad such ways, which we will call Postmodernist, Computer, and Game simulation.

Postmodernist simulation

Here the term is drawn principally from Jean Baudrillard's identification of simulation with hyperreality (Baudrillard 1997). According to Baudrillard, simulacra are signs that cannot be exchanged with 'real' elements outside a given system of other signs, but only with other

signs within it. Crucially, these sign-for-sign exchanges assume the functionality and effectiveness of 'real' objects, which is why Baudrillard calls this regime of signs hyperreal. When, under these conditions, reality is supplanted by hyperreality, any reality innocent of signs disappears into a network of simulation.

In postmodernist debates over the past few decades claims that simulation is superseding representation have raised fundamental questions of the future of human political and cultural agency. Baudrillard himself, however, is no fan of postmodernist theory: 'The post-modern is the first truly universal conceptual conduit, like jeans or coca-cola . . . It is a world-wide verbal fornication' (Baudrillard 1996a: 70). This is in stark contrast to those who use Baudrillard's theorising as the exemplification of postmodern thought. Douglas Kellner, for instance, considers Baudrillard as resignedly telling the story of the death of the real without taking political responsibility for this story. Others consider him the media pessimist *par excellence*, who argues that the total coverage of the real with signs is equivalent to its absolute disappearance. Still others celebrate Baudrillard as an elegant 'so what?' in the face of the collapse of all values. All, however, omit the central point regarding his theory of simulation: that it functions and has effects – it is operational – and is therefore hyper-*real* rather than hyper-*fictional*. The grounds of this operativity are always, for Baudrillard, technological: 'Only technology perhaps gathers together the scattered fragments of the real' (Baudrillard 1996b: 4). 'Perhaps', he adds, 'through technology, the world is toying with us, the object is seducing us by giving us the illusion of power over it' (1996b: 5).

Baudrillard, who published an early (1967) and positive review of McLuhan's *Understanding Media*, makes it clear that the ground of hyperrealism is technology as a complex social actor over which we maintain an illusion of control. To cite a typically contentious Baudrillardian example, electoral systems in developed democratic states do not empower an electorate, but rather determine the exercise of democracy in cybernetic terms: voting for party X rather than party Y consolidates the governance of binary coding over political systems. This constitutes a 'simulation' of democracy not in the sense that there are really and in fact more complex political issues underlying this sham democracy; but rather in the sense that real and effective politics is now conducted in precisely this new scenario. Choice has become the only reality that matters, and it is precisely quantifiable. Thus the simulation, or transposition of democracy onto another scene, concerned exclusively with a hypertrophied 'choice', is the only political reality there is. It is for this reason that simulations constitute, for Baudrillard, the hyperreality of cybernetic governance. The 'perfect crime' to which the title of one of Baudrillard's works alludes is not the destruction of reality itself, but the destruction of an illusory reality beyond the technologies that make it work (Baudrillard 1996b). The effect is not a loss of reality, but the consolidation of a reality without an alternative.

Where commentators on contemporary cultural change have seized upon the concept of simulation is in noting a shift from 'representation' to simulation as dominant modes of the organisation of cultural objects and their signifying relationships to the world. According to such scholars 'representation' was conceived to be a cultural act, an artefact of negotiated meanings, pointing, however unsuccessfully or incompletely, to a real world beyond it. 'Simulation', they assert, supplants these negotiated relationships between social and cultural agents *and reality*, replacing them with relationships that operate *only within culture* and its mediations:

The theory of simulation is a theory of how our images, our communications and our media have usurped the role of reality, and a history of how reality fades.

(Cubitt 2001: 1)

Such critical approaches draw on theories that identify profound cultural, economic and political shifts taking place in the developed world in recent decades. A defining moment in the development of this approach is Guy Debord's *Society of the Spectacle* (1967), which argues that the saturation of social space with mass media has generated a society defined by spectacular rather than real relations. Although there are various approaches and positions within this broad trend, they generally share the assumption that the emergence in the postwar period of a consumption-led economy has driven a culture which is dominated and colonised by the mass media and commodification. The rise of this commercialised, mediated culture brings with it profound anxieties about how people might know, and act in, the world. The sheer proliferation of television screens, computer networks, theme parks and shopping centres, and the saturation of everyday life by spectacular images so thoroughly mediated and processed that any connection with a 'real world' seems lost, adds up to a simulated world: a hyperreality where the artificial is experienced as real. Representation, the relationship (however mediated) between the real world and its referents in the images and narratives of popular media and art, withers away. The simulations that take its place also replace reality with spectacular fictions whose lures we must resist. In broad outlines, this remains the standard view of Baudrillard's theses.

Accordingly, Baudrillard's controversial and often poorly-understood versions of simulation and simulacra have proved very influential on theories and analysis of postwar popular and visual culture. The nature of the ascendancy of this order of simulation over that of representation has been posited as being of fundamental importance to questions of the future of human political and cultural agency. Cultural and critical theory, when faced with the manufactured, the commodified and the artificial in modern culture, has identified the simulational and simulacral character of postwar culture in the developed world – a culture, it is claimed, that is increasingly derealised by the screens of the mass media, the seductions and veilings of commodification, and (more recently) the virtualisations of digital culture. For instance, Fredric Jameson describes the contemporary world as one in which all zones of culture and everyday life are subsumed by the commodifying reach of consumer capitalism and its spectacular media:

a whole historically original consumers' appetite for a world transformed into sheer images of itself and for pseudo-events and 'spectacles' . . . It is for such objects that we reserve Plato's concept of the 'simulacrum', the identical copy for which no original has ever existed. Appropriately enough, the culture of the simulacrum comes to life in a society where exchange value has been generalized to the point at which the very memory of use value is effaced, a society of which Guy Debord has observed, in an extraordinary phrase, that in it 'the image has become the final form of commodity reification . . .'.

(Jameson 1991: 18)

Similarly, for Cubitt, as reality fades, the materiality of the world around us becomes unsteady, 'the objects of consumption are unreal: they are meanings and appearances, style and fashion, the unnecessary and the highly processed' (Cubitt 2001: 5).

What is at stake for these theorists is that any sense of political agency or progressive knowledge is lost in this seductive, consumerist apocalypse. The relationship between the real and the mediated, the artificial and the natural, implodes. It is also clear how the technological sophistication, seductive/immersive and commercial nature of videogames might be seen as a particularly vivid symptom of this postmodernist condition (Darley 2000). It is equally clear, however, that these critics' conceptions of Baudrillard in general and simulation

in particular are at best partial, and at worst wholly misleading. For these reasons, it is wholly appropriate to refer to such a constellation of theories as ‘postmodernist’, as it is to argue that Baudrillard’s simulation is not postmodernist. Far from providing any specificity to the concept of simulation, the postmodernist approach generalises it to the point where it becomes an entire theory of culture (the pervasiveness of technological visual culture is further discussed in **1.5.3**, and with specific regard to the theory of the ‘virtual’ in **2.1–2.6**).

Computer simulation

The second use of the concept reflects a more specific concern with simulation as a particular form of computer media (Woolley 1992, Lister *et al.* 2003, Frasca 2003, Prensky 2001). Just as a confusion of imitation, representation or mimesis with simulation arises in postmodernist uses, critical approaches to computer simulation tend to take a more nuanced attitude to the mimetic elements sometimes (but not always) present in simulation. The principal difference is, in this case, that simulation is not a dissembling, illusory distraction from the real world (like Eco’s Disneyland) but rather a model of the world (or of some aspect of it). This context presents a more specific and differentiated use of simulation than that of the postmodernists. For some (writers, engineers, social scientists, military planners, etc.) the computer simulation models complex and dynamic systems over time in ways impossible in other media.

Marc Prensky, in a book that espouses the use of computer games in education and training, offers three definitions of simulation:

- any synthetic or counterfeit creation
- creation of an artificial world that approximates the real one
- a mathematical or algorithmic model, combined with a set of initial conditions, that allows prediction and visualisation as time unfolds (Prensky 2001: 211)

The first and second of these definitions recall the confusion of some aspects of simulation with imitation. That a simulation is a ‘counterfeit’ (definition 1) suggests it may be smuggled in, unnoticed, to stand in for ‘the real thing’. That it is ‘synthetic’, by contrast, suggests only that it has been manufactured. Just as it would be false to say that any manufactured product, by virtue of being manufactured, counterfeits a reality on which it is based (what does a car counterfeit?), so it would be equally false to argue that all simulations ‘counterfeit’ a reality. In short, if manufacturing goods adds additional elements to reality, so too, surely, should manufacturing simulations.

Definition 2 repeats this error: an artificial world does not necessarily approximate the real one. Consider, for example, the work of exobiologists – biologists who research the possible forms life on other worlds might take. An exobiologist, for instance, might simulate a world with denser gravity than ours; this would entail that, if life evolved on such a world, it would take a different form, with creatures perhaps more horizontally than vertically based, replacing legs with other means of locomotion, and so forth. Undoubtedly such a world is simulated, but it precisely does not approximate ours. In a more familiar sense, this is what we encounter in videogame-worlds, and the rules governing the motion of characters, the impact and consequence of collisions, and so on. In particular, the issue of ‘virtual gravity’ (generally weaker than the terrestrial variety with which we are familiar) demonstrates the extent to which such simulations owe their contribution to reality to their differences from, rather than approximations of, our own. We will see in section **5.3** that historians and theorists

of automata quite specifically differentiate between automata proper and simulacra – in brief, not all automata are simulacra, insofar as they do not necessarily approximate the human form. These examples alone ought to make us wary of suggesting any equivalence between imitation and simulation.

For the task in hand – the identification of analytical concepts and approaches in the study of computer simulation in the context of a general account of new media studies – Prensky's third definition of simulations as material (and mathematical) technologies and media is very useful. It recalls, for instance, both the temporal aspects of simulation (see below) and the Baudrillardian sense, reflecting on the notion of simulation as productive of reality, neither a 'counterfeit' nor necessarily an approximation of a real world beyond them. This is helpful in that such an account makes more obvious sense of those simulations used in many different contexts, for example by economists to predict market fluctuations, and by geographers to analyse demographic change. Unlike the postmodernist use of the term, this gain in applicability does not cost a loss of specificity. The processes of simulation are also foregrounded in gaming, since all digital games are simulations to some extent. Prensky cites Will Wright (the creator of *SimCity*, *The Sims*, and numerous other simulation games) discussing simulations as models quite different from, for example, balsa wood models. The simulation is temporal, modelling processes such as decay, growth, population shifts, not physical structures. The model, we might say in more familiar terms, really does precede the reality it produces (see again section 2.6 below).

In computer game culture the term 'simulation games' refers to a specific genre in which the modelling of a dynamic system (such as a city in *SimCity* or a household in *The Sims*) provides the main motive of the game as structure and gameplay experience

Simulation games

In recent years, game studies has adopted analytical, formal and descriptive approaches to the specificity of computer simulation software. 'Simulation' here refers to the particular character and operations of games, particularly computer and videogames, as processual, algorithmic media. Distinctions are made between simulation as a media form that models dynamic, spatio-temporal and complex relationships and systems (for example, of urban development and economics in *SimCity*) and the narrative or representational basis of other, longer-established, media (literature, film, television, etc.).

unlike traditional media, video games are not just based on representation but on an alternative semiotical structure known as simulation. Even if simulations and narrative do share some common elements – character, settings, events – their mechanics are essentially different. More importantly, they also offer distinct rhetorical possibilities.

(Frasca 2003: 222)

Gonzalo Frasca's simulations are media objects that model complex systems. They are not limited to computer media (pre-digital machines and toys can simulate) but come into their own with the processing affordances of computing. This emphasis on the simulational character of computer and videogames has proven to be productive in the task of establishing the distinctiveness of the videogame as a hybrid cultural form, emphasising features, structures and operations inherited from both its computer science and board game forebears over other sides of its family – notably its media ancestors (literature, cinema, television).

What distinguishes the computer simulation is precisely what video games remind us of: it is a dynamic real-time experience of intervening with sets of algorithms that model any environment or process (not just imitating existing ones) – playing with parameters and variables.

So simulation in a videogame could be analysed thus:

- 1 productive of reality – so in *Doom*, *Tomb Raider*, or *Grand Theft Auto* the game is representational on one level – tunnels, city streets, human figures, monsters and vehicles – part of the universe of popular media culture, but the experience of playing the game is one of interacting with a profoundly different kind of environment. These maps are not maps of any territory, but interfaces to a database and the algorithms of the computer simulation;
- 2 this ‘reality’ then is mathematically structured and determined. As Prensky points out, *The Sims* adds a fun interface to a cultural form rooted in science and the mathematical and traditionally presented only as numbers on the screen. Games such as *SimCity* incorporated a variety of ways of modelling dynamic systems – including linear equations (like a spreadsheet), differential equations (dynamic system-based simulations like *Stella*) and cellular automata – where the behaviors of certain objects come from their own properties and rules for how those properties interacted with neighbors rather than from overall controlling equations.

(Prensky 2001: 210–211).

Note: Prensky makes a clear connection here between the playful simulation of popular videogames and the computer science of Artificial Life. For more on ALife and cellular automata see **5.3.5**.

- 3 as we have seen, exobiology and some videogames clearly indicate that simulations can function without simulating or representing already existing phenomena and systems. The mimetic elements of *Tetris*, *Minesweeper* and *Donkey Kong* are residual at best, yet each of these games is a dynamic simulated world with its own spatial and temporal dimensions and dynamic relationships of virtual forces and effects. They simulate only themselves.
- 4 thinking of videogames as simulations also returns us to the assertion that the player’s experience of cyberspace is one not only of exploration but of realising or bringing the gameworld into being in a semiotic and cybernetic circuit:

The distinguishing quality of the virtual world is that the system lets the participant observer play an active role, where he or she can test the system and discover the rules and structural qualities in the process.

(Espen Aarseth 2001: 229)

For the cybernetic nature of videogame play see **4.5.6** and **5.4.4**

Summary

Ostensibly, these three positions have quite different objects of concern: the computer simulation of interest to game studies is not postmodernist simulation. Game studies is more modest – keen to establish the difference of games and simulations from narrative or representational media forms, rather than claiming simulation as an overarching model of contemporary culture. To analyse a videogame as a computer simulation is to understand it as an instance in everyday life, rather than as an all-encompassing hyperreality. Moreover, the screen metaphors of the postmodernist simulation carry little sense of the dynamic and procedural characteristics of computer simulation. Studied as such, computer simulations can be seen not only as the visual presentation of artificial realities (as, again, the screens of hyperreality suggest) but as the generation of dynamic systems and economies, often with (and always in videogames) an assumption of interactive engagement written into the models and processes.

The three broad concepts of simulation outlined above overlap however. Postmodernist simulation, though formulated before the rise of computer media to their current predominance and predicated on – crudely speaking – the electronic media and consumer culture, is now widely applied to the Internet, Virtual Reality and other new media forms. Discussions of the nature of computer simulations often also entail a consideration of the relationships (or lack of) between the computer simulation and the real world. Both make a distinction between ‘simulation’ (where a ‘reality’ is experienced that does not correspond to any actually existing thing), and ‘representation’ (or ‘mimesis’, the attempt at an accurate imitation or representation of some real thing that lies outside of the image or picture) – though often with very different implications and intentions.

To sum up: within all of these approaches to simulation there is a tendency to miss a key point: simulations are real, they exist, and are experienced within the real world which they augment. Since, as *Donkey Kong* and the alien creatures of exobiology teach us, not all simulations are imitations, it becomes much easier to see simulations as things in their own right, rather than as mere representations of other (‘realer’) things.

1.2.7 Conclusion

The characteristics which we have discussed above should be seen as part of a matrix of qualities that we argue is what makes new media different. Not all of these qualities will be present in all examples of new media – they will be present in differing degrees and in different mixes. These qualities are not wholly functions of technology – they are all imbricated into the organisation of culture, work and leisure with all the economic and social determinations that involves. To speak of new media as networked, for instance, is not just to speak of the difference between server technology and broadcast transmitters but also to talk about the deregulation of media markets. To talk about the concept of the virtual is not just to speak of head-mounted display systems but also to have to take into account the ways in which experiences of self and of identity are mediated in a ‘virtual’ space. Digitality, Interactivity, Hypertextuality, Virtuality, Networked Media and Simulation are offered as the beginnings of a critical map. This discussion of the ‘characteristics’ of new media has merely established the grounds upon which we might now begin substantially to address the questions that they raise.

1.3 Change and continuity

From this section to the end of Part 1 (1.3–1.6.6) we now change our tack. So far we have considered, as promised at the outset, what it is that we take to be ‘new media’ and we have gone as far as to suggest some defining characteristics. We now take up the question of what is involved in considering their ‘newness’. Enthusiastic students of media technologies might wonder why this is a necessary question. Why do we not simply attempt to describe and analyse the exciting world of media innovation that surrounds us? Writing in this manner would be at the mercy of what we referred to in the introduction as permanent ‘upgrade culture’ – no sooner published than out of date because it failed to offer any critical purchase on the field. There are plenty of existing sites for readers to catch up on latest developments most of which are designed to facilitate the reader’s consumption. Our purpose is to facilitate critical thinking. In order to do that we need to get beyond the banal pleasures of novelty to reveal how the ‘new’ is constructed. Our aim here is to enable a clarity of thought often disabled by the shiny dazzle of novelty. We hope to show that this centrally involves knowing

something about the history of media, the history of newness, and the history of our responses to media and technological change. But there is more to it than that. Here is a checklist and overview of what is to come, and why, in these last sections of Part 1.

- ‘Newness’ or what it is ‘to be new’ is not the simple quality we may take it to be and can be conceived of in several ways. This is discussed in **1.3–1.3.2**.
- New media ‘arrives’, has already been provided with, a history, or histories and these often seek to explain new media’s ‘newness’. Some of these histories are what are known as ‘teleological’ while others argue that a better approach is ‘genealogical’. Essentially, to consider the nature of the ‘new’ we have to become involved in theories ‘of’ history (or historiography). This is explained, with examples in **1.4** and **1.4.1**.
- Frequently, ‘new media’ (or indeed any media, ‘film’ for example) are thought, by some, to each have a defining essence. It is then argued that to realise this essence, to bring it into its own, requires a break with the past and old habits and ways of thinking. This too, is often associated with a sense of ‘progress’. Each medium is better (affording greater realism, greater imaginative scope, more efficient communication etc.) than those that proceed it. We examine these ideas as a ‘modernist concept of progress’ in **1.4.2**.
- Far from being the latest stage in a linear progression, much about new media recalls some much older, even ancient practices and situations. They appear to repeat or revive historical practices that had been forgotten or become residual. There is something like an ‘archaeology’ of new media. This is dealt with in **1.4.3–1.4.4**.
- New media are frequently contrasted (usually favourably) with ‘old media’. It is as if there is an implied critique of old media in new media. Old media are suddenly thrown into a bad light. This issue is raised in **1.5–1.5.1**, and leads us to:
- The discursive construction of media and The Technological Imaginary. Here we explore, through a number of case studies, the various ways in which media technologies are invested with significance as they are expected to realise hopes, satisfy desires, resolve social problems etc.; **1.5.2, 1.5.3, 1.5.4, 1.5.5** and **Case studies 1.4–1.7**.
- In this way we are brought to face a key question and a debate which typically becomes urgent as new media and new technologies emerge: do media technologies have the power to transform cultures? Or, are they just dumb tools, pieces of kit which reflect a society’s or a culture’s values and needs. In short, are ‘media’ determined or determining? As our media and communication technologies become more complex, powerful and pervasive, even (if contentiously) intelligent and self organising, this is an ever more important question and debate. Through a discussion of an earlier and informative debate between two major theorists of media (Raymond Williams and Marshall McLuhan) we open up this issue in some detail in **1.6–1.6.6**. This will prepare us to consider theories about culture, technology and nature (particularly those coming from Science and Technology Studies) which offer to avoid this vexed dichotomy.

1.3.1 Introduction

Media theorists, and other commentators, tend to be polarised over the degree of new media’s newness. While the various camps seldom engage in debate with each other, the argument is between those who see a media revolution and those who claim that, on

the contrary, behind the hype we largely have 'business as usual'. To some extent this argument hinges upon the disciplinary frameworks and **discourses (1.5.3)** within which proponents of either side of the argument work. What premisses do they proceed from? What questions do they ask? What methods do they apply? What ideas do they bring to their investigations and thinking?

In this section we simply recognise that while the view is widely held that new media are 'revolutionary' – that they are profoundly or radically new in kind – throughout the now extensive literature on new media there are also frequent recognitions that any attempt to understand new media requires a historical perspective. Many reasons for taking this view will be met throughout the book as part of its detailed case studies and arguments. In this section we look at the general case for the importance of history in the study of new media.

1.3.2 Measuring 'newness'

The most obvious question that needs to be asked is: 'How do we know that something is new or in what way it is new if we have not carefully compared it with what already exists or has gone before?' We cannot know with any certainty and detail how new or how large changes are without giving our thinking a historical dimension. We need to establish from what previous states things have changed. Even if, as Brian Winston observes, the concept of a 'revolution' is implicitly historical, how can one know 'that a situation has changed – has revolved – without knowing its previous state or position?' (Winston 1998: 2). In another context, Kevin Robins (1996: 152) remarks that, 'Whatever might be "new" about digital technologies, there is something old in the imaginary signification of "image revolution".' Revolutions then, when they take place, are historically relative and the idea itself has a history. It is quite possible to take the view that these questions are superfluous and only divert us from the main business. This certainly seems to be the case for many new media enthusiasts who are (somewhat arrogantly, we may suggest) secure in their conviction that the new is new and how it got to be that way will be of a lot less interest than what comes next!

However, if asked, this basic question can help us guard against missing at least three possibilities:

- 1 Something may appear to be new, in the sense that it looks or feels unfamiliar or because it is aggressively presented as new, but on closer inspection such newness may be revealed as only superficial. It may be that something is new only in the sense that it turns out to be a new version or configuration of something that, substantially, already exists, rather than being a completely new category or kind of thing. Alternatively, how can we know that a medium is new, rather than a hybrid of two or more older media or an old one in a new context which in some ways transforms it?
- 2 Conversely, as the newness of new media becomes familiar in everyday use or consumption (see **4.2** and **4.3**) we may lose our curiosity and vigilance, ceasing to ask questions about exactly what they do and how they are being used to change our worlds in subtle as well as dramatic ways.
- 3 A final possibility that this simple question can uncover is that on close inspection and reflection, initial estimates of novelty can turn out not to be as they seem. We find that some kinds and degrees of novelty exist but not in the ways that they were initially thought to. The history of what is meant by the new media buzzword 'interactivity' is a prime

example of the way a much-lauded quality of new media has been repeatedly qualified and revised through critical examination.

Case study 1.3: What is new about interactivity?

The overall point is that the 'critical' in the critical study of new media means not taking things for granted. Little is assumed about the object of study that is then illuminated by asking and attempting to answer questions about it. An important way of doing this – of approaching something critically – is to ask what its history is or, in other words, how it came to be as it is.

Lastly, in this review of reasons to be historical in our approach to new media, we need to recall how extensive and heterogeneous are the range of changes, developments, and innovations that get subsumed under the term 'new media'. This is so much the case that without some attempt to break the term or category down into more manageable parts we risk such a level of abstraction and generalisation in our discussions that they will never take us very far in the effort to understand one or another of these changes (see **1.1**). A better approach is to look for the different ratios of the old and the new across the field of new media. One way of doing this is, precisely, historical. It is to survey the field of new media in terms of the degree to which any particular development is genuinely and radically new or is better understood as simply an element of change in the nature of an already established medium.

Old media in new times?

For instance, it can be argued that 'digital television' is not a new medium but is best understood as a change in the form of delivering the contents of the TV medium, which has a history of some fifty years or more. This would be a case of what Mackay and O'Sullivan describe as an 'old' medium 'in new times' as distinct from a 'new medium' (1999: 4–5). On the other hand, immersive virtual reality or massively multi-player online gaming look to be, at least at first sight, mediums of a radically and profoundly new kind. This, however, still leaves us with the problem of defining what is truly new about them.

Before we accept this 'new/old' axis as a principle for distinguishing between kinds of new media, we have to recognise immediately that the terms can, to some extent, be reversed. For instance, it can be argued that some of the outcomes of producing and transmitting TV digitally have had quite profound effects upon its programming and modes of use and consumption such that the medium of TV has significantly changed (**Case study 1.7**). It could also be claimed that the increased image size, high definition, programmes on demand, interactive choice etc., of contemporary television effectively transforms the medium. Whether we would want to go as far as saying that it will be an entirely new medium still seems unlikely, if not impossible. On the other hand, the apparently unprecedented experiences offered by the technologies of immersive VR or online, interactive, multimedia can be shown to have histories and antecedents, both of a technological and a cultural kind, upon which they draw and depend (**1.2, 1.3**). Whether, in these cases, however, we would want to go as far as saying that therefore VR is adequately defined by tracing and describing its many practical and ideological antecedents is another matter.

The idea of 'remediation'

A third possibility is that put forward by Jay Bolter and Richard Grusin (1999) who, following an insight of Marshall McLuhan, effectively tie new media to old media as a structural condition of all media. They propose and argue at some length that the 'new', in turn, in new media is the manner in which the digital technologies that they employ 'refashion older media', and then these older media 'refashion themselves to answer to the challenges of new media'

(p. 15). It seems to us that there is an unassailable truth in this formulation. This is that new media are not born in a vacuum and, as media, would have no resources to draw upon if they were not in touch and negotiating with the long traditions of process, purpose, and signification that older media possess. Yet, having said this, many questions about the nature and extent of the transformations taking place remain.

CASE STUDY 1.3: What is new about interactivity?

From the 1990s onward, 'interactivity' became a key buzzword in the world of new media. The promise and quality of interactivity has been conceived in a number of ways.

The creative management of information

This concept of interactivity has roots in the ideas of early computer visionaries dating back as far as the 1940s, such as Vannevar Bush (1945) and Alan Kay and Adele Goldberg (1977) (both in Mayer 1999). These are visions of interactive computer databases liberating and extending our intellects. Such concepts, conceived in the years after the Second World War, were in part responses to the perceived threat of information overload in the modern world. Searchable databases that facilitated a convergence of existing print and visual media and the information they contained were seen as a new way for the individual to access, organise, and think with information.

Interactivity as consumer choice technologically embodied

We saw in our discussion of the concept in 1.2 how it has been central to the marketing of personal computers by linking it to contemporary ideas about consumer choice. On this view, being interactive means that we are no longer the passive consumers of identical ranges of mass-produced goods, whether intellectual or material. Interactivity is promoted as a quality of computers that offers us active choices and personalised commodities, whether of knowledge, news, entertainment, banking, shopping and other services.

The death of the author

During the 1990s, cybertheorists were keen to understand interactivity as a means of placing traditional authorship in the hands of the 'reader' or consumer (Landow 1992). Here, the idea is that interactive media are a technological realisation of a theory, first worked out mainly in relation to literature, known as 'post-structuralism'. We had, it was suggested, witnessed the 'death of the author', the central, fixed and god-like voice of the author behind the text (see, for example, Landow 1992). Interactivity meant that users of new media would be able to navigate their way across uncharted seas of potential knowledge, making their own sense of a body of material, each user following new pathways through the matrix of data each time they set out on their journeys of discovery.

A related idea is that the key property of interactivity is a major shift in the traditional relationship between the production and reception of media. This resides in the power that computers give the reader/user to 'write back' into a text. Information, whether in the form of text, image, or sound, is received within software applications that allow the receiver to change – delete, add, reconfigure – what they receive. It has not been lost on many thinkers that this practice, while enabled by electronic digital technology, resembles the medieval practice of annotating and adding extensive marginalia to manuscripts and books so that they became palimpsests. These are surfaces upon which generations of additions and commentaries are overwritten on texts, one on the other. While this is true it has only a limited sense. There is after all a tremendous difference between the operation of the Internet and the highly selective access of the privileged class of medieval monks to sacred texts.

More recently, in the face of exaggerated claims for the almost magical powers of interactivity and on the basis of practice-based critical reflection, more critical estimations have been made. As the artist Sarah Roberts has put it:

the illusion that goes along with [interactivity] is of a kind of democracy . . . that the artist is sharing the power of choice with the viewer, when actually the artist has planned every option that can happen . . . it's a great deal more complex than if you [the user] hadn't had a sort of choice, but it's all planned.

(Penny 1995: 64)

These concepts of interactivity are less descriptions of particular technical, textual, or experiential properties and more claims or propositions rooted in the inspired founding visions, imaginative marketing strategies, and the sophisticated analogies of academic theorists about new, real or imagined, possibilities of human empowerment. However, whatever merits these ideas have, whether visionary or opportunistic, they have been subjected to methodical enquiry from within a number of disciplines which we need to attend to if we are to get beyond these broad characterisations of interactivity.

Human–computer interaction: intervention and control

A technical idea of interactivity has taken shape most strongly within the discipline of human–computer interaction (HCI). This is a scientific and industrial field which studies and attempts to improve the interface between computers and users.

An ‘interactive mode’ of computer use was first posited during the years of mainframe computers when large amounts of data were fed into the machine to be processed. At first, once the data was entered, the machine was left to get on with the processing (batch processing). Gradually however, as the machines became more sophisticated, it became possible to intervene into the process whilst it was still running through the use of dialogue boxes or menus. This was known as operating the computer in an ‘interactive’ mode (Jensen 1999: 168). This ability to intervene in the computing process and see the results of your intervention in real time was essentially a *control* function. It was a one-way command communication from the operator to the machine. This is a very different idea of interaction from the popularised senses of hypertextual freedom described above (Huhtamo 2000).

This idea of *interaction as control* continued to develop through the discipline of HCI and was led by the ideas of technologists like Licklider and Engelbart (Licklider and Taylor 1999 [orig: 1968]; Engelbart 1999 [orig: 1963]). If the kind of symbiosis between operator and machine that they envisaged was to take place then this interactive mode had to be extended and made available outside of the small groups who understood the specialised programming languages. To this end, during the early 1970s, researchers at the Xerox Palo Alto Research Center developed the GUI, the graphical user interface, which would work within the simultaneously developed standard format for the PC: keyboard, processor, screen and mouse. In what has become one of the famous moments in the history of Xerox, they failed to exploit their remarkable breakthroughs. Later, Apple were able to use the GUI to launch their range of PCs in the early 1980s: first the Apple Lisa, then in 1984 the celebrated Apple Mac. These GUI systems were then widely imitated by Microsoft.

Communication studies and the ‘face-to-face’ paradigm

However, this idea of *interaction as control*, as interface manipulation, is somewhat at odds with the idea of interactivity as a mutually reciprocal communication process, whether between user and machine/database or between user and user. Here we encounter an understanding of the term derived from sociology and communications studies. This tradition has attempted to describe and analyse interactivity and computers in relation to interactivity in face-to-face human communication. In this research interaction is identified as a core human behaviour, the foundation of culture and community. For communications theorists interaction is a quality present in varying degrees as a quality of communication. So a question and answer pattern of communication is somewhat ‘less’ interactive than an open-ended dialogue (see, for example, Shutz 2000; Jensen 1999). Similarly the modes of interactivity described in 1.2 would here be classified on a scale of least to most interactive, with the various kinds of CMC ‘most’ interactive and the navigational choices ‘least’ interactive.

Various commentators (for example, Stone 1995: 10; Aarseth 1997: 49) quote Andy Lippman’s definition of interactivity generated at MIT in the 1980s as an ‘ideal’. For Lippman interactivity was ‘mutual and simultaneous activity on the part of both participants, usually working toward some goal, but not necessarily’. This state needed to be achieved through a number of conditions:

Mutual interruptibility

limited look ahead (so that none of the partners in the interaction can foresee the future shape of the interaction)

no default (there is no pre-programmed route to follow)

the impression of an infinite database (from the participants’ point of view).

(Stone 1995: 10–11)

This sounds like a pretty good description of conversation, but a very poor description of using a point-and-click interface to 'interact' with a computer.

The study of artificial intelligence

There seem to us to be some real problems with the application of communications theories based in speech to technologically mediated communications. Unresolved, these problems lead to impossible expectations of computers, expectations that open up a gap between what we experience in computer-based interaction and what we might desire. Often this gap gets filled by predictions drawn from yet another methodological field – that of artificial intelligence (AI). The argument usually goes something like this. Ideal human-computer interaction would approach as close as possible to face-to-face communication; however, computers obviously can't do that yet since they are (still) unable to pass as human for any length of time. Futuristic scenarios (scientific and science fictional) propose that this difficulty will be resolved as chips get cheaper and computing enters into its ubiquitous phase (see **ubiquitous computing** and pervasive media). In the meantime we have to make do with various degrees along the way to 'true' (i.e. conversational) interaction. In this construction interactivity is always a failure awaiting rescue by the next development on an ever-shifting technological event horizon.

Media studies

Understandings of interactivity not only draw on HCI, communications studies, and AI research but often call up debates around the nature of media audiences and their interpretations of meanings that have been generated within media studies. Influential strands within media studies teach that audiences are 'active' and make multiple and variable interpretative acts in response to media texts:

the meaning of the text must be thought of in terms of which set of discourses it encounters in any particular set of circumstances, and how this encounter may restructure both the meaning of the text and the discourses which it meets.

(Morley 1980: 18)

This reading of audience behaviour is sometimes referred to as an 'interactive' activity. Prior to the emergence of computer media, it is argued that as readers we already had 'interactive' relationships with (traditional analogue) texts. This position is then extended to argue that not only do we have complex interpretative relationships with texts but active material relationships with texts; we have long written marginalia, stopped and rewound the videotape, dubbed music from CD to tape, physically cut and pasted images and text from print media into new arrangements and juxtapositions. In this reading, interactivity comes to be understood as, again, a kind of technological correlative for theories of textuality already established and an extension of material practices that we already have. So, for instance, even though we might not all share the same experience of a website we may construct a version of 'the text' through our talk and discussion about the site; similarly it is argued we will not all share the same experience of watching a soap opera. Indeed, over a period of weeks we will almost certainly not see the same 'text' as other family members or friends, but we can construct a common 'text' through our responses and talk about the programme. The text and the meanings which it produces already only exist in the spaces of our varied interpretations and responses.

In other words there is a perspective on interactivity, based in literary studies and media studies, that argues that nothing much has changed in principle. We are just offered more opportunities for more complex relationships with texts but these relationships are essentially the same (Aarseth 1997: 2). However, we would argue that the distinction between interaction and interpretation is even more important now than previously. This is because the problems which face us in understanding the processes of mediation are multiplied by new media: the acts of multiple interpretation of traditional media are not made irrelevant by digital and technological forms of interactivity but are actually made more numerous and complex by them. The more text choices available to the reader the greater the possible interpretative responses. The very necessity of intervention in the text, of manipulation of the text's forms of interaction, requires a more acute understanding of the act of interpretation.

Grassroots democratic exchange

Beyond the particular ways of understanding interactivity that flow from the four methodologies we have discussed, there lies another, more diffuse yet extremely powerful, discourse about interactivity that is so pervasive as to have become taken for granted. Within this usage 'interactive' equals automatically better – better than passive, and better than just 'active' by virtue of some implied reciprocity. This diffuse sense of the virtue of interactivity also has a social and cultural history, dating from the late 1960s and early 1970s. In this history, democratising challenges to established power systems were led by constant calls for dialogue and increased lateral, rather than vertical and hierarchical, communications as a way of supporting social progress. This ideological attack on one-way information flows in favour of lateral or interactive social communications lay behind much of the radical alternative rhetorics of the period. A community arts and media group active in London through the 1970s and 1980s, under the name of 'Interaction', is characteristic of the period in its analysis:

The problems of a pluralist urban society (and an over populated one dependent on machines as well) are very complex. Answers, if there are any, lie in the ability to relate, to inform, to listen – in short the abilities of creative people.

(Berman 1973: 17)

The abilities to 'relate' and to 'listen' are the skills of face-to-face dialogue and social interaction recast as a progressive force. This valorisation of social dialogue was 'in the air' in the early 1970s. It informed a radical critique of mainstream media which took root not only in the burgeoning of alternative and community media practices of the period but also in early ideas about computer networking. As was pointed out by Resource One, a community computing facility based in the Bay area of San Francisco:

Both the quantity and content of available information is set by centralised institutions – the press, TV, radio, news services, think tanks, government agencies, schools and universities – which are controlled by the same interests which control the rest of the economy. By keeping information flowing from the top down, they keep us isolated from each other. Computer technology has thus far been used . . . mainly by the government and those it represents to store and quickly retrieve vast amounts of information about huge numbers of people. . . . It is this pattern that convinces us that control over the flow of information is so crucial.

(Resource One Newsletter, 2 April 1974, p. 8)

This support for 'democratic media' is a kind of popular and latter-day mobilisation of ideas derived from the **Frankfurt School**, with its criticisms of the role of mass media in the production of a docile population seduced by the pleasures of consumption and celebrity (1.5.4). In this reading 'interactive' media are constructed as a potential improvement on passive media in that they appear to hold out the opportunity for social and political communications to function in a more open and democratic fashion which more closely approaches the ideal conditions of the public sphere.

We are now in a position to see that the idea of interactivity, as one of the primary 'new' qualities of new media, comes to us as an automatic asset with a rich history. Yet, as we have also seen, it is a term that carries the weight of a number of different, and contradictory, histories. It may be possible to argue that it is precisely this lack of definition which makes it such a suitable site for our investment in the idea of 'the new'.

1.5.4 The return of the Frankfurt School critique in the popularisation of new media

1.4 What kind of history?

"I Love Lucy" and "Dallas", FORTRAN and fax, computer networks, comsats, and mobile telephones. The transformations in our psyches triggered by the electronic media thus far may have been preparation for bigger things to come' (Rheingold 1991: 387).

In 1.3 we posed a number of basic questions that need to be asked if critical studies of new media are to proceed without being based upon too many assumptions about what we are

dealing with. We strongly suggested that asking these questions requires us to take an interest in the available histories of older media. There is, however, another important reason why the student of new media may need to pay attention to history. This is because, from their very inception, new media have been provided with histories, some of which can be misleading.

From the outset, the importance of new media, and the kind of futures they would deliver, has frequently been conceived as part of a historical unfolding of long-glimpsed possibilities. As the quote above suggests, such accounts imply that history may only have been a preparation for the media technologies and products of our time. In other words, a historical imagination came into play at the moment we began to strive to get the measure of new media technologies. These historical perspectives are often strongly marked by paradoxically old-fashioned ideas about history as a progressive process. Such ideas rapidly became popular and influential. There is little exaggeration in saying that, subsequently, a good deal of research and argument in the early years of 'new media studies' has been concerned with criticising these 'histories' and outlining alternative ways of understanding media change.

This section

While this book is not the place to study theories of history in any depth, a body of historical issues now attaches itself to the study of new media. Some examples, and an idea of the critical issues they raise, are therefore necessary. In this section we first consider what are known as **teleological** accounts of new media (**1.4.1**). The meaning of this term will become clearer through the following discussion of some examples but, broadly, it refers to the idea that new media are a direct culmination of historical processes. In this section, by taking an example of work on the history of new media we seek to show that there can be no single, linear historical narrative that would add to our understanding of all that 'new media' embraces. Instead, we are clearly faced with a large number of intersecting histories. These are unlikely to fall into a pattern of tributaries all feeding regularly and incrementally into a main stream. We would be hard put to think, let alone prove, that all of the developments, contexts, agents and forces that are involved in these histories had anything like a shared goal or purpose. We then outline the approaches of some theorists of new media who, rejecting the idea that new media can simply be understood as the utopian end point of progressive historical development, seek alternative ways of thinking about the differences and the complex connections between old and new media. In doing this we will consider how Michel Foucault's influential 'genealogical' theory of history has found a place in studies of new media (**1.4.1**).

Lastly, we consider a view derived from modernist aesthetics, which argues that for a medium to be genuinely new its unique essence has to be discovered in order for it to break itself free from the past and older media (**1.4.2**). In questioning this idea we introduce a number of examples in which new media are seen to recall the past, rather than break with it (**1.4.3**).

1.4.1 Teleological accounts of new media

From cave paintings to mobile phones

In a once popular and influential history of 'virtual reality', Howard Rheingold takes us to the Upper Palaeolithic cave paintings of Lascaux, where 30,000 years ago, 'primitive but effective cyberspaces may have been instrumental in setting us on the road to computerized world building in the first place' (Rheingold 1991: 379). He breathlessly takes his reader on a journey which has its destination in immersive virtual environments. En route we visit the origins of Dionysian drama in ancient Greece, the initiation rites of the Hopi, Navajo, and Pueblo tribes 'in the oldest continuously inhabited human settlements in North America', the virtual

worlds of TV soap operas like *I Love Lucy* and *Dallas*, arriving at last to meet the interactive computing pioneers of Silicon Valley, major US universities and Japanese corporations. In Rheingold's sweeping historical scheme, the cave painting appears to hold the seeds of the fax machine, the computer network, the communications satellite and the mobile phone (Rheingold 1991: 387)!

Few examples of this way of understanding how we came to have a new medium are as mind-boggling in their Olympian sweep as Rheingold's. But, as we shall see, other theorists and commentators, often with more limited ambitions, share with him the project to understand new media as the culmination or present stage of development of all human media over time. When this is done, new media are placed at the end of a chronological list that begins with oral communication, writing, printing, drawing and painting, and then stretches and weaves its way through the image and communication media of the nineteenth and twentieth centuries, photography, film, TV, video and semaphore, telegraphy, telephony and radio. In such historical schemas there is often an underlying assumption or implication – which may or may not be openly stated – that new media represent a stage of development that was already present as a potential in other, earlier, media forms. A further example will help us see how such views are constructed and the problems associated with them.

From photography to telematics: extracting some sense from teleologies

Peter Weibel, a theorist of art and technology, former director of Ars Electronica and now director of a leading centre for new media art (ZKM, the Zentrum für Kunst und Medientechnologie, in Karlsruhe, Germany), offers an 8-stage historical model of the progressive development of technologies of image production and transmission which, having photography as its first stage, spans 160 years (1996: 338–339).

Weibel notes that in 1839 the invention of photography meant that image making was freed for the first time from a dependence upon the hand (this is Stage 1). Images were then further unfixed from their locations in space by electronic scanning and telegraphy (Stage 2). In these developments Weibel sees 'the birth of new visual worlds and telematic culture' (1996: 338).

Then, in Stages 3–5, these developments were 'followed by' film which further transformed the image from something that occupied space to one that existed in time. Next, the discovery of the electron, the invention of the cathode ray tube, and magnetic recording brought about the possibility of a combination of film, radio, and television – and video was born. At this stage, Weibel observes, 'the basic conditions for electronic image production and transfer were established' (1996: 338).

In Stage 6, transistors, integrated circuits and silicon chips enter the scene. All previous developments are now revolutionised as the sum of the historical possibilities of machine-aided image generation are at last united in the multimedia, interactive computer. This newly interactive machine, and the convergence of all other technological media within it, then join with telecommunications networks and there is a further liberation as 'matterless signs' spread like waves in global space (Stage 7). A new era (first glimpsed at Stage 2) now dawns: that of post-industrial, telematic civilisation.

So, Stage 7, Weibel's penultimate stage, is that of interactive telematic culture, more or less where we may be now at the end of the first decade of the twenty-first century. His final Stage 8 tips us into the future, a stage 'until now banished to the domain of science fiction' but 'already beginning to become a reality' (1996: 339). This is the sphere of advanced sensory technologies in which he sees the brain as directly linked to 'the digital realm' (*ibid.*).

Weibel clearly sees this history as progressive, one in which 'Over the last 150 years the

mediatisation and mechanisation of the image, from the camera to the computer have advanced greatly' (1996: 338). There is a direction, then, advancing toward the present and continuing into the future, which is revealed by the changing character of our media over time.

As we look back over Weibel's eight stages we see that the 'advances' all concern the increasing dematerialisation of images and visual signs, their separation from the material vehicle which carries them. The final, culminating stage in this dynamic is then glimpsed: neurological engineering which is about to usher in a direct interfacing of the brain with the world – a world where no media, material or immaterial, exist. We have the end of media or, as his title states, *The World as Interface*.

What kind of history is being told here?

- Each of Weibel's stages points to real technological developments in image media production and transmission. These technologies and inventions did happen, did and do exist.
- Moving out from the facts, he then offers brief assessments of what these developments have meant for human communication and visual culture. In these assessments, the insights of other media theorists show through.
- Overall, Weibel organises his observations chronologically; the stages follow each other in time, each one appearing to be born out of the previous one.
- There is an ultimate point of origin – photography. The birth of this image technology is placed as a founding moment out of which the whole process unfolds.
- He finds a logic or a plot for his unfolding story – his sequential narrative of progress. This is the story of the increasing automation of production and increasing separation of signs (and images) from any physical vehicle that carries them.

This story is not without sense. But it is important to see that it is, in actuality, an argument. It is an organisation and integration of facts and ways of thinking about those facts. Facts? Photography and then telecommunications were invented. Hard to contest. Ways of thinking about the significance of those facts? Photography and telecommunications converged to mean that reality (real, material, physically tangible space) disappeared. A dramatic pronouncement that, at the very least, we may want to debate.

By selectively giving each fact a particular kind of significance (there are many others that he could have found), Weibel is making a case. Although it is more focused than the example we took from Rheingold's 'history' of VR, it is basically similar in that an argument is made in the form of a historical narrative. Within Weibel's 'history' he foregrounds and makes us think about some very important factors. Good, perceptive and well-researched stories have always done this.

However, at the same time, there are some big problems with Weibel's account if we take it as a credible historical account without asking further questions about its implications. This is because he does not tell us why and how the apparent unfolding of events takes place. What drives this march of media from machine-aided production of material images (photography) to the simulation of 'artificial and natural worlds', and even the coming simulation of the 'brain itself'? What, in this pattern of seamless evolution, has he detected? How was the bloom of interactive 'telematic civilisation' always contained in the seed of photography?

Historical narratives of the kind that Rheingold and Weibel tell are forms of teleological argument. These are arguments in which the nature of the past is explained as a preparation

for the present. The present is understood as being prefigured in the past and is the culmination of it. Such arguments seek to explain how things are in terms of their 'ends' (their outcomes or the purposes, aims and intentions that we feel they embody) rather than in prior causes. There have been many versions of such teleological historical explanation, beginning with those that saw the world as the outcome of God's design, through various kinds of secular versions of grand design, of cosmic forces, the unfolding of a world soul, through to dialectical explanation in which the present state of things is traceable to a long historical interplay of opposites and contradictions which inevitably move on toward a resolution. Related, if slightly less deterministically teleological, versions of historical explanation think in terms of history as a process of problem solving. Often a kind of relay race of great geniuses, in which each one takes up the questions left by their predecessors and, in each case, it is implied that the project is somehow communicated across and carried on over centuries of time as the final answer is sought.

Such attempts to find a (teleo)logic in history were strong in the nineteenth century, particularly in Western Europe and North America. Here, a dominant sense of optimism and faith in the progress of industry and science encouraged the view that history (as the growth, evolution and maturing of human societies) was drawing to a close.

Operating over very different timescales, both Rheingold and Weibel continue to tell stories about the rise of new media by adopting a kind of historical perspective which is as old as the hills. There is something of a paradox in the way in which new media have rapidly been provided with histories of a rather naive and uncritical (we are tempted to say old-fashioned) kind.

While we have stressed the importance of historical knowledge and research to understanding the contemporary field of new media, it does not, in our view, readily include these kinds of **teleology** which can be highly misleading in their grand sweep and the way in which they place new media, far too simply, as the end point of a long process of historical development.

Seeing the limits of new media teleologies

We now look at a third and recent contribution to the history of new media. This is a historical overview, in which Paul Mayer identifies the 'seminal ideas and technical developments' that lead to the development of computer media and communication. He traces the key concepts which lead from an abstract system of logic, through the development of calculating machines, to the computer as a 'medium' which can 'extend new possibilities for expressions, communication, and interaction in everyday life' (Mayer 1999: 321).

The important point for our present discussion is that as Mayer's thorough historical outline of 'pivotal conceptual insights' proceeds, we can also see how other histories that are quite distinct from that of the conceptual and technical development of computing itself are entwined with the one he traces. At various points in his history, doors are opened through which we glimpse other factors. These factors do not contribute directly to the development of computer media, but they indicate how quite other spheres of activity, taking place for other reasons, have played an essential but contingent part in the history of new media. We will take two examples.

In the first section of his history Mayer traces the conceptual and practical leaps which led to the building of the first mainframe computers in the 1940s. He begins his history with the project of the late-seventeenth-century philosopher, Leibniz, to formulate a way of reasoning logically by matching concepts with numbers, and his efforts to devise a 'universal logic machine' (Mayer 1999: 4). He then points to a whole range of other philosophical,

mathematical, mechanical, and electronic achievements occurring in the 300-year period between the 1660s and the 1940s. The history leads us to the ideas and practical experiments in hypermedia carried out by Vannevar Bush and Ted Nelson (1.2.3) in the mid-twentieth century. It is a history which focuses on that part of technological development that involves envisioning: the capacity to think and imagine possibilities from given resources.

Clearly, many of these achievements, especially the earlier ones, were not directed at developing the computer as a medium as we would understand it. Such a use of the computer was not part of the eighteenth- and nineteenth-century frame of reference: it was not a conceivable or imaginable project. As Mayer points out, Leibniz had the intellectual and philosophical ambitions of his period (the late seventeenth and early eighteenth centuries) as one of the ‘thinkers who advanced comprehensive philosophical systems during the Age of Reason’ with its interest in devising logical scientific systems of thought which had universal validity (Mayer 1999: 4). Neither were our modern ideas about the interpersonal communications and visual-representational possibilities of the computer in view during the nineteenth-century phase of the Industrial Revolution. At this time the interest in computing was rooted in the need for calculation, ‘in navigation, engineering, astronomy, physics’ as the demands of these activities threatened to overwhelm the human capacity to calculate. (This last factor is an interesting reversal of the need that Vannevar Bush saw some 100 years later, in the 1950s, for a machine and a system that would augment the human capacity to cope with an overload of data and information [1.2.3].)

Hence, as we follow Mayer’s historical account of key figures and ideas in the history of computing, we also see how the conceptual development of the modern computer as medium took place for quite other reasons. At the very least these include the projects of eighteenth-century philosophers, nineteenth-century industrialisation, trade and colonisation, and an early twentieth-century need to manage statistics for the governance and control of complex societies. As Mayer identifies, it is only in the 1930s when, alongside Turing’s concept of ‘the universal machine’ which would automatically process any kind of symbol and not just numbers, the moment arrives in which, ‘the right combination of concepts, technology and political will colluded to launch the construction of machines recognisable today as computers in the modern sense’ (1999: 9). In short, while Mayer traces a set of chronological connections between ‘pivotal concepts’ in the history of computing, we are also led to see:

- 1 That the preconditions were being established for something that was not yet conceived or foreseen: the computer as a medium.
- 2 That even the conceptual history of computing, formally presented as a sequence of ideas and experiments, implies that other histories impact upon that development.

To sum up, we are led to see that a major factor in the development of computer media is the eventual impact of one set of technologies and practices – those of computing numbers – on other sets: these being social and personal practices of communication and aural, textual and visual forms of representation. In short, a set of technological and conceptual developments which were undertaken for one set of reasons (and even these, as we have seen, were not stable and sustained, as the philosophical gave way to the industrial and the commercial, and then the informational) have eventually come to transform a range of image and communication media. It is also apparent that this happened in ways that were completely unlooked for. New image and communications media were not anticipated by the

thinkers, researchers, technologists and the wider societies to which they belonged, during the period between the eighteenth and the mid-twentieth century in which digital computing develops (Mayer 1999).

If this first example begins to show how teleological accounts obscure and distort the real historical contingency of computer media, our second example returns us to the greater historical complexity of what are now called new media. Mayer's focus is on the computer as a medium itself: the symbol-manipulating, networked machine through which we communicate with others, play games, explore databases and produce texts. Returning to our initial breakdown of the range of phenomena that new media refers to (**1.1**), we must remind ourselves that this is not all that new media has come to stand for. Computer-mediated communication, Mayer's specific interest, is only one key element within a broader media landscape that includes convergences, hybridisations, transformations, and displacements within and between all forms of older media. These media, such as print, telecommunications, photography, film, television and radio, have, of course, their own, and in some cases long, histories. In the last decades of the twentieth century these histories of older media become precisely the kinds of factors that began to play a crucial role in the development of computer media, just as the demands of navigators or astronomers for more efficient means of calculating did in the nineteenth.

This is a vital point as Mayer's historical sketch of the conceptual development of the computer ends, with Alan Kay and Adele Goldberg's 1977 prototype for an early personal computer named the 'Dynabook'. He observes that the 'Dynabook' was conceived by its designers as 'a metamedium, or a technology with the broadest capabilities to simulate and expand the functionality and power of other forms of mediated expression' (Mayer 1999: 20). Kay and Goldberg themselves make the point somewhat more directly when they write that 'the computer, viewed as a medium itself, can be all other media'. In the late 1970s, Kay and Goldberg's vision of the media that the Dynabook would 'metamediate' was restricted to text, painting and drawing, animation and music. (Subsequently, of course, with increased memory capacity and software developments, the 'other media' forms which the computer 'can be' would include photography, film, video and TV.)

On the face of it, this seems simple enough. What Kay and Goldberg are saying is that the computer as a 'medium' is able to simulate other media. However, both they and Mayer, in his history, seem to assume that this is unproblematic. As Mayer puts it, one of the great things about the Dynabook as a prototype computer medium, is that it is an 'inspiring realisation of Leibniz's generality of symbolic representation' (1999: 21) due to its ability to reduce all signs and languages – textual, visual, aural – to a binary code (**1.2.1**). It does a great deal more besides, of course: it 'expand[s] upon the functionality and power of other forms of mediated expression' (1999: 20). However, this convergence and interaction of many previously separate media actually makes the picture far more complicated. We have to remind ourselves that this range of 'old' media, that the computer carries and simulates, have in turn their own histories. Ones which parallel, and in some cases are far older than that of the computer.

The media which the computer 'simulates and expands' are also the result of conceptual and technical, as well as cultural and economic, histories which have shaped them in certain ways. In an expanded version of Mayer's history, space would need to be made for the ways in which these traditional media forms contributed to thinking about the Dynabook concept itself. For, if we are to understand the complex forms of new media it is not enough to think only in terms of what the computer might have offered to do for 'other forms of mediated expression' but also to ask how these other media forms shaped the kind of 'metamediating'

that Goldberg and Kay envisaged. The universal symbol-manipulating capacity of the computer could not, by itself, determine the forms and aesthetics of the computer medium. This is because the very media that the computer (as medium) incorporates (or metamediates) are not neutral elements: they are social and signifying practices. We would want to know, for instance, what the outcomes of other histories – the conventions of drawing, the genres of animation, the trust in photographic realism, the narrative forms of text and video, and the languages of typography and graphic design, etc. – brought to this new metamedium. These are, in fact, the very issues which have come to exercise practitioners and theorists of new media, and which the various parts of this book discuss.

Foucault and genealogies of new media

A widely read theorist of new media, Mark Poster, has suggested:

The question of the new requires a historical problematic, a temporal and spatial framework in which there are risks of setting up the new as a culmination, telos or fulfillment of the old, as the onset of utopia or **dystopia**. The conceptual problem is to enable a historical differentiation of old and new without initialising a totalising narrative. Foucault's proposal of a genealogy, taken over from Nietzsche, offers the most satisfactory resolution.

(Poster 1999: 12)

In this way, Poster sums up the problems we have been discussing. How do we envisage the relationship of new and old media over time, sequentially, and in space (what kind of co-existence or relationship with each other and where?) without assuming that new media bring old media to some kind of concluding state for good or bad? How do we differentiate between them without such sweeping, universalising schemas as we met above? Foucault's concept of genealogy is his answer.

Jay Bolter and Richard Grusin introduce their book on new media, entitled *Remediation*, with an explicit acknowledgement of their debt to Foucault's method:

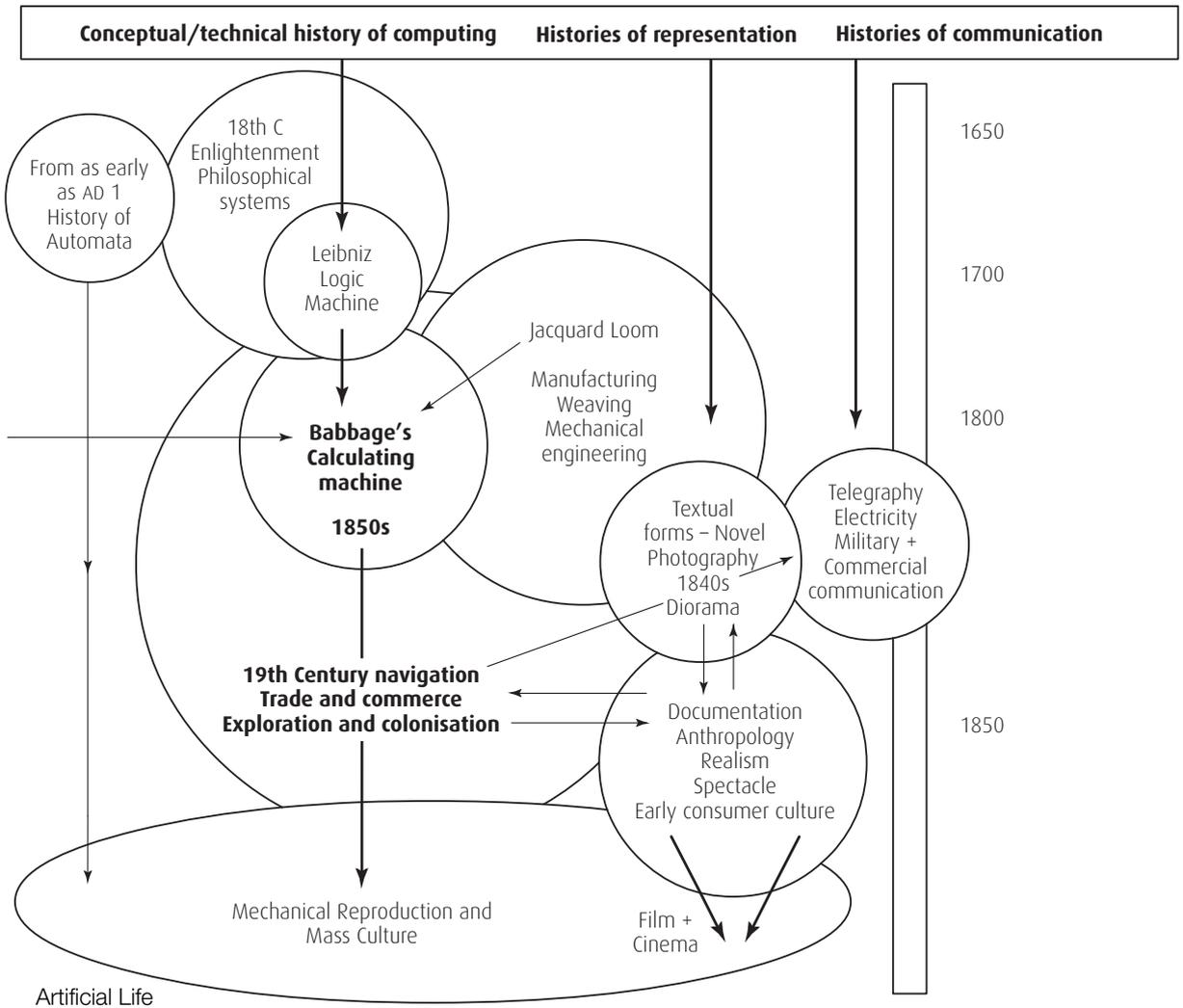
The two logics of remediation have a long history, for their interplay defines a genealogy that dates back at least to the Renaissance and the invention of linear perspective. Note 1: Our notion of genealogy is indebted to Foucault's, for we too are looking for historical affiliations or resonances, and not of origins. Foucault . . . characterised genealogy as 'an examination of descent', which 'permits the discovery, under the unique aspect of a trait or a concept of the myriad events through which – thanks to which, against which – they were formed'.

(Bolter and Grusin 1999: 21)

1.2.3 Hypertextual 1.4.1 Teleological accounts of new media

How does an idea or a practice, which for Bolter and Grusin is the concept and practice of remediation (the way that one medium absorbs and transforms another), reach us (descend)? What multiple factors have played a part in shaping that process?

We should note that Poster is particularly keen to avoid thinking of history as a process with a 'culmination' and end point. Bolter and Grusin, like Foucault, are not interested in the origins of things. They are not interested in where things began or where they finished. They are interested in 'affiliations' (the attachments and connections between things) and 'resonances' (the sympathetic vibrations between things). They want to know about the 'through' and 'against' of things. Instead of images of linear sequences and chains of events we need to think in terms of webs, clusters, boundaries, territories, and overlapping spheres as our images of historical process.



1.6 A simple model of the complex of histories 'through' and 'against' which new media emerge.

Theorists of new media seeking alternative ways of thinking about the differences and the complex connections between old and new media have drawn upon the influential 'genealogical' theory of history, as argued and put into practice in a number of major works of cultural history by the philosopher-historian Michel Foucault. It is a historical method which offers the possibility of thinking through new media's relationship to the past while avoiding some of the problems we have met above. In doing this, theorists of new media are following in the footsteps of other historians of photography, film, cinema and visual culture such as John Tagg (1998), Jonathan Crary (1993) and Geoffrey Batchen (1997) who have used what has become known as a 'Foucauldian' perspective.

1.4.2 New media and the modernist concept of progress

the full aesthetic potential of this medium will be realised only when computer artists come to the instrument from art rather than computer science . . . Today the kind of simulation envisioned . . . requires a \$10 million Cray-1 supercomputer, the most powerful computer in the world . . . [T]he manufacturers of the Cray-1 believe that by the early 1990s computers with three-fourths of its power will sell for approximately \$20,000 less than the cost of a portapak and editing system today . . . [F]inally accessible to autonomous individuals, the full aesthetic potential of computer simulation will be revealed, and the future of cinematic languages . . . will be rescued from the tyranny of perceptual imperialists and placed in the hands of artists and amateurs.

(Youngblood 1999: 48)

In the name of 'progress' our official culture is striving to force the new media to do the work of the old.

(McLuhan and Fiore 1967a: 81)

In order to conceive a properly genealogical account of new media histories we need not only to take account of the particular teleologies of technohistory above but also the deeply embedded experience of **modernism** within aesthetics.

Commentators on new media, like Gene Youngblood, frequently refer to a future point in time when their promise will be realised. Thought about new media is replete with a sense of a deferred future. We are repeatedly encouraged to await the further development of the technologies which they utilise. At times this takes the simple form of the 'when we have the computing power' type of argument. Here, the present state of technological (under)development is said to constrain what is possible and explains the gap between the potential and actual performance (see for example, our discussion of virtual reality, **2.1**) .

Related to views of this kind, there are some which embody a particular kind of theory about historical change. It is not technological underdevelopment *per se* that is blamed for the failure of a new medium to deliver its promise; rather, the culprit is seen to be ingrained cultural resistance. Here, the proposal is that in their early phases new media are bound to be used and understood according to older, existing practices and ideas, and that it is largely such ideological and cultural factors that limit the potential of new media. (See also **1.6**.) The central premiss here is that each medium has its own kind of essence; that is, some unique and defining characteristic or characteristics which will, given time and exploration, be clearly revealed. As they are revealed the medium comes into its own. This kind of argument adds ideas about the nature of media and culture to the simpler argument about technological underdevelopment.

Such a view has quite a long history itself, as will be seen in the example from the pioneering writer on 'expanded' cinema, Gene Youngblood, quoted at the beginning of this section. Writing in 1984, in an essay on the then emerging possibilities of digital video and cinema (in Druckery 1999), he looks forward to the 1990s when he foresees affordable computers coming to possess the kind of power that, at his time of writing, was only to be found in the \$10 million Cray-1 mainframe supercomputer. Then, in a clear example of the modernist argument that we have outlined, he adds that we must also look forward to the time when the 'full aesthetic potential of the computer simulation will be revealed', as it is rescued from 'the tyranny of perceptual imperialists' (in Druckery 1999: 48). Such imperialists being, we can assume, those scientists, artists and producers who impose their old habits of vision

and perception upon the new media (see **2.3**).

In a more recent example, Steve Holzmann (1997: 15) also takes the view that most existing uses of new media fail to 'exploit those special qualities that are unique to digital worlds'. Again, this is because he sees them as having as yet failed to break free of the limits of 'existing paradigms' or historical forms and habits. He, too, looks forward to a time when new media transcend the stage when they are used to fulfil old purposes and when digital media's 'unique qualities' come to 'define entirely new languages of expression'.

As Bolter and Grusin have argued (1999: 49–50), Holzmann (and Youngblood before him in our other example) represent the modernist viewpoint. They believe that for a medium to be significantly new it has to make a radical break with the past.

A major source of such ideas is to be found in one of the seminal texts of artistic modernism: the 1961 essay 'Modernist Painting' by art critic and theorist Clement Greenberg. Although the new, digital media are commonly understood as belonging to a postmodern period, in which the cultural projects of modernism are thought to have been superseded, Greenbergian ideas have continued to have a considerable pull on thinking about new media. Clearly, the point of connection is between the sense that new media are at the cutting edge of culture, that there is an opening up of new horizons and a need for experimentation, and the ideology of the earlier twentieth-century artistic avant-garde movements in painting, photography, sculpture, film and video.

We meet these modernist ideas whenever we hear talk of the need for new media to break clear of old habits and attitudes, the gravity field of history and its old thought patterns and practices. It is also present when we hear talk about the essential characteristics of new media; when the talk is of the distinctive essence of 'digitality' as against the 'photographic', the 'filmic' or the 'televisual' (**1.2**).

Greenberg himself did not think that modern art media should or could break with the past in any simple sense. But he did think they should engage in a process of clarifying and refining their nature by not attempting to do what was not proper to them. This process of refinement included ditching old historical functions that a medium might have served in the past. Painting was the medium that interested him in particular, and his efforts were part of his search to identify the importance of the painting in an age of mechanical reproduction – the age of the then relatively 'new' media of photography and film. He argued that painting should rid itself of its old illustrative or narrative functions to concentrate on its formal patterning of colour and surface. Photography was better suited to illustrative work and showed how it was not, after all, appropriate to painting. Painting could now realise its true nature.

Greenberg also made his arguments in the mid-twentieth-century context of a critique of the alienating effects of capitalism on cultural experience. He shared with other critics the view that the heightened experiences that art had traditionally provided were being eroded and displaced by a levelling down to mere 'entertainment' and popular kitsch. He argued that the arts could save their higher purpose from this fate 'by demonstrating that the kind of experience they provided was valuable in its own right and not obtained from any other kind of activity' (Greenberg 1961, in Harrison and Wood 1992: 755). He urged that this could be done by each art determining, 'through the operations peculiar to itself, the effects peculiar and exclusive to itself' (*ibid.*). By these means each art would exhibit and make explicit 'that which was unique and irreducible' to it (*ibid.*). The task of artists, then, was to search for the fundamental essence of their medium, stripping away all extraneous factors and borrowings from other media. It is often thought that this task now falls to new media artists and forward-looking experimental producers.

However, the manner in which a new medium necessarily adopts, in its early years, the

conventions and ‘languages’ of established media is well known. There is the case of the early photographers known as the Pictorialists, who strove to emulate the aesthetic qualities of painting, seeing these as the standards against which photography as a medium had to be judged. In Youngblood’s terms they would be examples of ‘perceptual imperialists’ who acted as a brake on the exploration of the radical representational possibilities afforded by photography as a new medium. Similarly, it is well known that early cinema adopted the conventions of the theatre and vaudeville, and that television looked for its forms to theatre, vaudeville, the format of the newspaper, and cinema itself.

As we have seen, Bolter and Grusin’s theory of ‘remediation’ (1999) deploys a Foucauldian historical perspective to argue against the ‘comfortable modernist rhetoric’ of authentic media ‘essences’ and ‘breaks with the past’ that we have discussed here. They follow McLuhan’s insight that ‘the content of a medium is always another medium’ (1999: 45). They propose that the history of media is a complex process in which all media, including new media, depend upon older media and are in a constant dialectic with them (1999: 50). Digital media are in the process of representing older media in a whole range of ways, some more direct and ‘transparent’ than others. At the same time, older media are refashioning themselves by absorbing, repurposing, and incorporating digital technologies. Such a process is also implied in the view held by Raymond Williams, whose theory of media change we discuss fully later (1.6.3). Williams argues that there is nothing inherent in the nature of a media technology that is responsible for the way a society uses it. It does not, and cannot, have an ‘essence’ that would inevitably create ‘effects peculiar and exclusive to itself’. In a closely argued theory of the manner in which television developed, he observes that some 20 years passed before, ‘new kinds of programme were being made for television and there were important advances in the productive use of the medium, including . . . some kinds of original work’ (Williams 1974: 30). Productive uses of a new medium and original work in them are not precluded, therefore, by recognising their long-term interplay with older media.

We need, then, to ask a number of questions of the modernist and avant-garde calls for new media to define itself as radically novel. Do media proceed by a process of ruptures or decisive breaks with the past? Can a medium transcend its historical contexts to deliver an ‘entirely new language’? Do, indeed, media have irreducible and unique essences (which is not quite the same as having distinguishing characteristics which encourage or constrain the kind of thing we do with them)? These seem to be especially important questions to ask of new digital media which, in large part, rely upon hybrids, convergences and transformations of older media.

The term ‘affordance’, taken from design theory may be relevant here. For example, ‘. . . the term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used . . . A chair affords (“is for”) support, and, therefore, affords sitting. A chair can also be carried. Glass is for seeing through, and for breaking’ (Norman 2002: 9)

1.4.3 The return of the Middle Ages and other media archaeologies

This section looks at yet another historicising approach to new media studies; here, however, insights from our encounters with new media are drawn upon to rethink existing media histories. Such revisions imply a view of history that is far from teleological, or a basis in the belief in inevitable ‘progress’. Unlike the previous examples we turn here to a kind of historical thinking that neither looks at new media as the fulfilment of the recent past nor does it assume a future time in which new media will inevitably transcend the old. Rather, it is suggested that certain uses and aesthetic forms of new media significantly recall residual or suppressed intellectual and representational practices of relatively, and in some cases extremely, remote historical periods. In the context of his own argument against ‘sequential narratives’ of change in image culture, Kevin Robins observes that:

It is notable that much of the most interesting discussion of images now concerns not digital futures but, actually, what seemed until recently to be antique and forgotten media (the panorama, the camera obscura, the stereoscope): from our postphotographic vantage point these have suddenly acquired new meanings, and their reevaluation now seems crucial to understanding the significance of digital culture.

(Robins 1996: 165)

The ludic: cinema and games

A major example of this renewed interest in ‘antique’ media is in the early cinema of circa 1900–1920 and its prehistory in mechanical **spectacles** such as the panorama. Its source is in the way the structures, aesthetics and pleasures of computer games are being seen to represent a revival of qualities found in that earlier medium. It is argued that this ‘cinema of attractions’ was overtaken and suppressed by what became the dominant form of narrative cinema, exemplified by classical Hollywood in the 1930s–1950s. Now, at the beginning of the twenty-first century, changes in media production and in the pleasures sought in media consumption, exemplified in the form of the computer game and its crossovers with special effects ‘blockbuster’ cinema, indicate a return of the possibilities present in early cinema. These ideas and the research that supports them are discussed in more detail later (see **2.7**). What is significant in the context of this section is the way that noticing things about new media has led some of its theorists to find remarkable historical parallels which cannot be contained within a methodology of technological progress, but rather of loss, suppression or marginalisation, and then return.

Rhetoric and spatialised memory

Benjamin Woolley, writing about Nicholas Negroponte’s concept of ‘spatial data management’, exemplified in computer media’s metaphorical desktops, and simulated 3D working environments, draws a parallel with the memorising strategies of ancient preliterate, oral cultures. He sees the icons and spaces of the computer screen recalling the ‘mnemonic’ traditions of classical and medieval Europe. Mnemonics is the art of using imaginary spaces or ‘memory palaces’ (spatial arrangements, buildings, objects, or painted representations of them) as aids to remembering long stories and complex arguments (Woolley 1992: 138–149). Similarly, with a focus on computer games, Nickianne Moody (1995) traces a related set of connections between the forms and aesthetics of role play games, interactive computer games and the allegorical narratives of the Middle Ages.

Edutainment and the eighteenth-century Enlightenment

Barbara Maria Stafford observes that with the increasingly widespread use of interactive computer graphics and educational software packages we are returning to a kind of ‘oral-visual culture’ which was at the centre of European education and scientific experiment in the early eighteenth century (1994: xxv). Stafford argues that during the later eighteenth century, and across the nineteenth, written texts and mass literacy came to be the only respectable and trustworthy media of knowledge and education. Practical and the visual modes of enquiry, experiment, demonstration and learning fell into disrepute as seductive and unreliable. Now, with computer animation and modelling, virtual reality, and even email (as a form of discussion), Stafford sees the emergence of a ‘new vision and visionary art-science’, a form of visual education similar to that which arose in the early eighteenth century, ‘on the boundaries between art and technology, game and experiment, image and speech’ (ibid.). However, she argues, in order for our culture to guide itself through this ‘electronic upheaval’ (ibid.) we will

need 'to go backward in order to go forward', in order to 'unearth a past material world that had once occupied the centre of a communications network but was then steadily pushed to the periphery' (ibid.: 3).

Stafford's case is more than a formal comparison between two periods when the oral, visual and practical dominate over the literary and textual. She also argues that the use of images and practical experiments, objects and apparatuses, that characterised early **Enlightenment** education coincided with the birth of middle-class leisure and early forms of consumer culture (1994: xxi). Stafford also suggests that our late twentieth- and early twenty-first-century anxieties about 'dumbing down' and 'edutainment' are echoed in eighteenth-century concerns to distinguish authentic forms of learning and scientific demonstration from quackery and charlatanism. Her argument, overall, is that the graphic materials of eighteenth-century education and scientific experiment were the 'ancestors of today's home- and place-based software and interactive technology' (ibid.: xxiii).

In each of these cases, history is not seen simply as a matter of linear chronology or unilinear progress in which the present is understood mainly as the superior development of the immediate past; rather, short-circuits and loops in historical time are conceived. Indeed, it chimes with the postmodern view that history (certainly social and cultural history) as a continuous process of progressive development has ceased. Instead, the past has become a vast reservoir of styles and possibilities that are permanently available for reconstruction and revival. The most cursory glance at contemporary architecture, interior design and fashion will show this process of retroactive culture recycling in action.

We can also make sense of this relation between chronologically remote times and the present through the idea that a culture contains dominant, residual, and emergent elements (Williams 1977: 121–127). Using these concepts, Williams argues that elements in a culture that were once dominant may become residual but do not necessarily disappear. They become unimportant and peripheral to a culture's major concerns but are still available as resources which can be used to challenge and resist dominant cultural practices and values at another time. We might note, in this connection, how cyber-fiction and fantasy repeatedly dresses up its visions of the future in medieval imagery. The future is imagined in terms of the past. As Moody puts it:

Much fantasy fiction shares a clearly defined quasi-medieval diegesis. One that fits snugly into Umberto Eco's categorisation of the 'new middle ages' . . . For Eco it would be entirely logical that the 'high tech' personal computer is used to play dark and labyrinthine games with a medieval diegesis.

(Moody 1995: 61)

For Robins, the significance of these renewed interests in the past, driven by current reflections on new media, is that they allow us to think in non-teleological ways about the past and to recognise what 'modern culture has repressed and disavowed' (1996: 161) in its overriding and often exclusive or blind concern for technological rationalism. The discovery of the kind of historical precedents for new media which our examples stand for, may, in his terms, be opportunities for grasping that new media are not best thought of as the narrow pinnacle of technological progress. Rather, they are evidence of a more complex and richer co-existence of cultural practices that the diverse possibilities of new media throw into fresh relief.

1.4.4 A sense of déjà vu

The **utopian**, as well as **dystopian**, terms in which new media have been received have caused several media historians to record a sense of déjà vu, the feeling that we have been here before. In particular, the quite remarkable utopian claims made for earlier new media technologies such as photography and cinema have been used to contextualise the widespread technophilia of the last fifteen or so years (e.g. Dovey 1995: 111). So, the history in question this time is not that of the material forerunners of new image and communication media themselves but of the terms in which societies responded to and discussed earlier 'media revolutions'. This is discussed more fully later (**1.5**).

Two kinds of historical enquiry are relevant here. The first is to be found in the existing body of media history, such as: literacy (Ong 2002), the printing press (Eisenstein 1979), the book (Chartier 1994), photography (Tagg 1998), film and television (Williams 1974). These long-standing topics of historical research provide us with detailed empirical knowledge of what we broadly refer to as earlier 'media revolutions'. They also represent sustained efforts to grasp the various patterns of determination, and the surprising outcomes of the introductions, over the long term, of new media into particular societies, cultures and economies. While it is not possible to transfer our understanding of the 'coming of the book' or of 'the birth of photography' directly and wholesale to a study of the cultural impact of the computer, because the wider social context in which each occurs is different (**1.5**), such studies provide us with indispensable methods and frameworks to guide us in working out how new technologies become media, and with what outcomes.

Second, a more recent development has been historical and ethnographic research into our imaginative investment in new technologies, the manner in which we respond to their appearance in our lives, and the ways in which the members of a culture repurpose and subvert media in everyday use (regardless of the purposes which their inventors and developers saw for them). This is also discussed more fully in (**1.5**), where we deal with the concept of the 'technological imaginary'(**1.5.2**).

1.4.5 Conclusion

Paradoxically, then, it is precisely our sense of the 'new' in new media which makes history so important – in the way that something so current, rapidly changing and running toward the future also calls us back to the past. This analytic position somewhat challenges the idea that new media are 'postmodern' media; that is, media that arise from, and then contribute to, a set of socio-cultural developments which are thought to mark a significant break with history, with the 'modern' industrial period and its forerunner in the eighteenth-century age of Enlightenment. We have seen that thinking in terms of a simple separation of the present and the recent past (the postmodern) from the 'modern' period may obscure as much as it reveals about new media. We have argued instead for a history that allows for the continuation of certain media traditions through 'remediation', as well as the revisiting and revival of suppressed or disregarded historical moments in order to understand contemporary developments. Our review of (new) media histories is based in the need to distinguish between what may be new about our contemporary media and what they share with other media, and between what they can do and what is ideological in our reception of new media. In order to be able to disregard what Langdon Winner (1989) has called 'mythinformation' we have argued that history has never been so important for the student of media.

1.5 Who was dissatisfied with old media?

We live in this very weird time in history where we're passive recipients of a very immature, noninteractive broadcast medium. Mission number one is to kill TV.

(Jaron Lanier, quoted in Boddy 1994: 116)

Photographers will be freed from our perpetual restraint, that of having . . . to record the reality of things . . . freed at last from being the mere recorders of reality, our creativity will be given free rein.

(Laye, quoted in Robins 1991: 56)

1.5.1 The question

The question that forms the title of this section is asked in order to raise a critical issue – what were the problems to which new communications media are the solutions? We might, of course, say that there were none. 'New' media were simply that – 'new' – in themselves and have no relation to any limits, shortcomings, or problems that might have been associated with 'old' media. But, the two quotes above, one referring to television and the other to photography, can stand for many other views and comments that strongly suggest that they do.

In thinking about such a question we will find ourselves considering the discursive frameworks that establish the conditions of possibility for new media. This in turn will allow us to look at some of the ways in which previously 'new' media have been considered in order to understand the discursive formations present in our contemporary moment of novelty.

In the rumours and early literature about the coming of multimedia and virtual reality, and as soon as new media forms themselves began to appear, they were celebrated as overcoming, or at least as having the promise to overcome, the negative limits and even the oppressive features of established and culturally dominant analogue media. As the above statements about television and photography imply, in the reception of new media there was, and still is, an implication that we needed them in order to overcome the limits of the old.

On this basis it could seem reasonable to ask whether media were in such bad odour in pre-digital days, that a mass of criticism and dissatisfaction formed a body of pressure such that something better was sought. Or, alternatively, we might ask whether ideas about the superiority of new media are merely retrospective projections or post-hoc rationalisations of change; simply a case of wanting to believe that what we have is better than what went before.

However, these questions are too reductive to arrive at an understanding of how our perceptions and experiences of new media are framed. In order to arrive at a better explanation, this section considers how the development and reception of new media have been shaped by two sets of ideas. First, the socio-psychological workings of the 'technological imaginary'; second, earlier twentieth-century traditions of media critique aimed at the 'mass' broadcast media and their perceived social effects. We will be interested in these traditions to the extent that they are picked up and used in the evaluation of new media.

1.5.2 The technological imaginary

The phrase the 'technological imaginary', as it is used in critical thought about cinema in the first place (De Lauretis *et al.* 1980) and now new media technologies, has roots in psychoanalytic theory. It has migrated from that location to be more generally used in the study of

culture and technology. In some versions it has been recast in more sociological language and is met as a 'popular' or 'collective' imagination about technologies (Flichy 1999). Here, tendencies that may have been originally posited (in psychoanalytical theory) as belonging to individuals are also observed to be present at the level of social groups and collectivities. However, some of the specific charge that the word has in psychoanalytic theory needs to be retained to see its usefulness. The French adjective *imaginaire* became a noun, a name for a substantive order of experience, the *imaginaire*, alongside two others – the 'real' and the 'symbolic' – in the psychoanalytic theories of Jacques Lacan. After Lacan, *imaginaire* or the English 'imaginary' does not refer, as it does in everyday use, to a kind of poetic mental faculty or the activity of fantasising (Ragland-Sullivan 1992: 173–176). Rather, in psychoanalytic theory, it refers to a realm of images, representations, ideas and intuitions of fulfilment, of wholeness and completeness that human beings, in their fragmented and incomplete selves, desire to become. These are images of an 'other' – an other self, another race, gender, or significant other person, another state of being. Technologies are then cast in the role of such an 'other'. When applied to technology, or media technologies in particular, the concept of a technological imaginary draws attention to the way that (frequently gendered) dissatisfactions with social reality and desires for a better society are projected onto technologies as capable of delivering a potential realm of completeness.

This can seem a very abstract notion. The Case studies in this section show how, in different ways, new media are catalysts or vehicles for the expression of ideas about human existence and social life. We can begin to do this by reminding ourselves of some typical responses to the advent of new media and by considering the recurring sense of optimism and anxiety that each wave of new media calls up.

As a new medium becomes socially available it is necessarily placed in relation to a culture's older media forms and the way that these are already valued and understood. This is seen in expressions of a sense of anxiety at the loss of the forms that are displaced. Well-known examples of this include the purist fears about the impact of photography on painting in the 1840s, and of television and then video on cinema in the 1970s. More recently, regret has been expressed about the impact of digital imaging on photography (Ritchen 1990) and graphics software on drawing and design as they moved from the traditional craft spaces of the darkroom and the drawing board to the computer screen. In terms of communication media this sense of loss is usually expressed in social, rather than aesthetic or craft terms. For instance, during the last quarter of the nineteenth century it was feared that the telephone would invade the domestic privacy of the family or that it would break through important settled social hierarchies, allowing the lower classes to speak (inappropriately) to their 'betters' in ways that were not permitted in traditional face-to-face encounters (Marvin 1988). (See **Case study 1.5.**) Since the early 1990s, we have seen a more recent example in the widespread shift that has taken place between terrestrial mail and email. Here anxieties are expressed, by some, about the way that email has eradicated the time for reflection that was involved in traditional letter writing and sending leading to notorious email 'flaming' and interperate exchanges (see also **Case study 1.2.**)

Conversely, during the period in which the cultural reception of a new medium is being worked out, it is also favourably positioned in relation to existing media. The euphoric celebration of a new medium and the often feverish speculation about its potential is achieved, at least in part, by its favourable contrast with older forms. In their attempts to persuade us to invest in the technology advertisers often use older media as an 'other' against which the 'new' is given an identity as good, as socially and aesthetically progressive. This kind of comparison draws upon more than the hopes that a culture has for its new media, it also involves

its existing feelings about the old (Robins 1996).

Traditional chemical photography has played such a role in recent celebrations of digital imaging (see Lister 1995; Robins 1995), as has television in the talking-up of interactive media. Before the emergence and application of digital technologies, TV, for instance, was widely perceived as a 'bad object' and this ascription has been important as a foil to celebrations of interactive media's superiority over broadcast television (Boddy 1994; see also **Case study 1.5**). Television is associated with passivity, encapsulated in the image of the TV viewer as an inert 'couch potato' subject to its 'effects', while the interactive media 'user' (already a name which connotes a more active relation to media than does 'viewer') conjures up an image of someone occupying an ergonomically designed, hi-tech swivel chair, alert and skilled as they 'navigate' and make active choices via their screen-based interface. Artists, novelists, and technologists entice us with the prospect of creating and living in virtual worlds of our own making rather than being anonymous and passive members of the 'mass' audience of popular television. As a broadcast medium, TV is seen as an agent for the transmission of centralised (read authoritarian or incontestable) messages to mass audiences. This is then readily compared to the new possibilities of the one-to-one, two-way, decentralised transmissions of the Internet or the new possibilities for narrowcasting and interactive TV. Similar kinds of contrast have been made between non-linear, hot-linked, hypertext and the traditional form of the book which, in this new comparison, becomes 'the big book' (like this one), a fixed, dogmatic text which is the prescriptive voice of authority.

So, a part of understanding the conditions in which new media are received and evaluated involves (1) seeing what values a culture has already invested in old media, and this may involve considering whose values these were, and (2) understanding how the concrete objects (books, TV sets, computers) and the products (novels, soap operas, games) of particular media come to have good or bad cultural connotations in the first place (see **Case studies 1.5, 1.6**). In order to do this we first consider how apparent the technological imaginary is in the ways we talk and write about media.

Case study 1.5 New media as arenas for discussing old problems

1.5.3 The discursive construction of new media

It is essential to realise that a theory does not find its object sitting waiting for it in the world: theories constitute their own objects in the process of their evolution. 'Water' is not the same theoretical object in chemistry as it is in hydraulics – an observation which in no way denies that chemists and engineers alike drink, and shower in, the same substance.

(Burgin 1982: 9)

Victor Burgin offers this example of the way that the nature of a common object of concern – water – will be differently understood according to the specific set of concepts which are used to study it. A key argument of post-structuralist theory is that language does not merely describe a pre-given reality (words are matched to things) but that reality is only known through language (the words or concepts we possess lead us to perceive and conceive the world in their terms). Language, in this sense, can be thought of as operating as microscopes, telescopes and cameras do – they produce certain kinds of images of the world; they construct ways of seeing and understanding. Elaborated systems of language (conversations, theories, arguments, descriptions) which are built up or evolved as part of particular social projects (expressing emotion, writing legal contracts, analysing social behaviour, etc.) are called discourses. Discourses, like the words and concepts they employ, can then be said

to construct their objects. It is in this sense that we now turn to the discursive construction of new media as it feeds (frames, provides the resources for) the technological imagination.

In sections **1.3** and **1.4** we considered some ways in which histories of media form part of our contemporary responses to new media. On meeting the many claims and predictions made for new media, media historians have expressed a sense of *déjà vu* – of having ‘seen this’ or ‘been here’ before (Gunning 1991). This is more than a matter of history repeating itself. This would amount to saying that the emergence and development of each new medium occurs and proceeds technologically and socio-economically in the same way, and that the same patterns of response are evident in the members of the culture who receive, use and consume it. There are, indeed, some marked similarities of this kind, but it would be too simple to leave the matter there. To do this would simply hasten us to the ‘business as usual’ conclusion which we have rejected as conservative and inadequate (**1.1** and **1.3**). More importantly, it would be wrong. For, even if there are patterns that recur in the technological emergence and development of new media technologies, we have to recognise that they occur in widely different historical and social contexts. Furthermore, the technologies in question have different capacities and characteristics.

For example, similarities are frequently pointed out between the emergence of film technology and the search for cinematic form at the end of the nineteenth century and that of multimedia and VR at the end of the twentieth century. However, film and cinema entered a world of handmade images and early kinds of still photographic image (at that time, a difficult craft), of venue-based, mechanically produced theatrical spectacles in which the ‘movement’ and special effects on offer were experienced as absolutely novel and would seem primitive by today’s standards. There was no broadcasting, and even the telephone was a novel apparatus. And, of course, much wider factors could be pointed to: the state of development of mass industrial production and consumer culture, of general education, etc. The world into which our new media have emerged is very different; it has seen a hundred years of increasingly pervasive and sophisticated technological visual culture (Darley 1991).

It is a world in which images, still and moving, in print and on screens, are layered so thick, are so intertextual, that a sense of what is real has become problematic, buried under the thick sediment of its visual representations. New media technologies which emerge into this context enter an enormously complex moving image culture of developed genres, signifying conventions, audiences with highly developed and ‘knowing’ pleasures and ways of ‘reading’ images, and a major industry and entertainment economy which is very different from, even if it has antecedents in, that of the late nineteenth century.

What then gives rise to the sense of *déjà vu* mentioned above? It is likely that it does not concern the actual historical repetition of technologies or mediums themselves – rather, it is a matter of the repetition of deeply ingrained ways in which we think, talk, and write about new image and communication technologies. In short, their discursive construction. Whatever the actual and detailed paths taken by a new media technology in its particular historical context of complex determinations (the telephone, the radio, TV, etc.) it is a striking matter of record that the responses of contemporaries (professionals in their journals, journalists, academic and other commentators) are cast in uncannily similar terms (Marvin 1988; Spiegel 1992; Boddy 1994).

In noticing these things, the experience of loss with the displacement of the old, the simultaneous judgement of the old as limited, and a sense of repetition in how media and technological change is talked and written about, we are ready to consider some more detailed examples of the ‘technological imaginary’ at work.

CASE STUDY 1.4: The technological imaginary and the 'new media order'

Key text: Kevin Robins, 'A touch of the unknown', in K. Robins (1996) *Into the Image*, Routledge, London and New York.

Entering cyberspace is the closest we can come to returning to the Wild West . . . the wilderness never lasts long – you had better enjoy it before it disappears.

(Taylor and Saarinen 1994: 10)

As we have seen, a broad definition of the 'technological imaginary' refers us to the way that new technologies are taken up within a culture and are hooked into, or have projected onto them, its wider social and psychological desires and fears. Kevin Robins has applied the ideas of the psychoanalyst Wilfred Bion and other philosophers and political theorists to argue this case. He has returned to this theme in a number of essays dealing with new media and cyberculture, especially VR and new image and vision technologies (Robins 1996). In these essays he seeks to show how the dominant way in which we are asked to understand new media is exclusively driven by utopian, rationalist and transcendental impulses to escape the difficulties of social reality, and that these have deep roots in Western capitalist societies:

The new image and information culture is now associated with a renewed confidence in technological solutions to the problems of human culture and existence. The new technologies have revitalised the utopian aspirations in the modern techno-rationalist project. The progressivist and utopian spirit is articulated through ordinary, spontaneous and commonsensical accounts of what is happening: through the culture, there is a sense of almost limitless possibilities inherent in the 'cyber-revolution'. *Indeed, such is the dominant technological imaginary, that it is almost impossible to discuss the new techno-culture in any other way.*

(Robins 1996: 13; emphasis added)

He argues that behind the transcendental rhetorics of late twentieth- and early twenty-first-century techno-culture is an old human project to contain and master the ever present threat of **chaos** and disorder.

What is psychically compelling about the technologies I am considering here . . . is their capacity to provide a certain security and protection against the frightful world and against the fear that inhabits our bodies. They provide the means to distance and detach ourselves from what is fear provoking in the world and in ourselves.

(Robins 1996: 12)

For Robins, the technological imaginary of the 'new media order' is but the latest instance of a long history of similar 'psychic investments we make in technological forms'. He sees the modern (nineteenth- and early twentieth-century) 'social imaginary' as having always been expansionist and utopian, leading us to seek out new frontiers, the other side of which lie better worlds. As real places and frontiers become exhausted, the cyberspaces and places of virtual life promised by new media become the new utopias which we reach for across a new technological frontier (1996: 16). Now, assessments of the value of computer-mediated communication, online communities, and the new virtual selves that await us in cyberspace can be understood as elements of a 'distinctive social vision' born of the contemporary technological imaginary (1996: 24).

Robins argues that this desire for better, less problematic (cyber) spaces is driven by a deep fear of disorder, of the unknown and meaninglessness. In a manner that is reminiscent of McLuhan, Robins sees the modern world 'surveyed by absolute vision', as a world which could be ordered, controlled, surveilled and manipulated from an omnipotent distance. This has been, and continues to be, 'massively facilitated by the development of a succession of new technological means' (1996: 20). Co-existing with this desire for technologically empowered control, the technological imagination leads us to dream of the pleasure of shifting our existence to 'an alternative environment, one that has been cleansed of the real world's undesirable qualities' by entering 'into the image'. This is now achieved through the IMAX screen and lies behind our fascination with the prospect of immersive VR; formerly it was sought in the form of Hayles tours, panoramas, and early cinema (1996: 22). (See **2.7.**)

CASE STUDY 1.5: New media as arenas for discussing old problems

Key text: Carolyn Marvin (1988) *When Old Technologies Were New: Thinking About Electric Communication in the Nineteenth Century*, Oxford University Press, New York and Oxford.

Discussions of electrical and other forms of communication in the late nineteenth century begin from specific cultural and class assumptions about what communication ought to be like among particular groups of people. These assumptions informed the beliefs of nineteenth-century observers about what these new media were supposed to do . . .

(Marvin 1988: 6)

If Robins's understanding of the contemporary technological imaginary of the 'new media order' stresses its utopian character, Carolyn Marvin, in her research into the early history of electric communications technologies, sees them as 'arenas for negotiating issues crucial to the conduct of social life'. She argues that beneath their more obvious functional meanings (the ways in which new media offer greater speed, capacity, and better performance) a whole range of 'social meanings can elaborate themselves' (Marvin 1988: 4). She describes the varied, surprising and furious experiments that were undertaken to see how the new technologies might extend existing social and cultural practices. In its early years, the telephone was used to relay orchestral concerts to the homes of the wealthy and privileged, it was informally co-opted by groups of lonely musicians in order to 'jam' together over the telephone lines, and telephone operators used their vantage point to gossip and spread private information within small communities. As such things happened, questions were raised about who, in society, has the power to define the use of technologies, who should use them and to what ends, what their implications are for settled patterns of social life, what needs to be defended, and whose interests should be furthered.

For Carolyn Marvin, 'the introduction of new media is a special historical occasion when patterns anchored in older media that have provided the stable currency of social exchange are re-examined, challenged, and defended' (Marvin 1988: 4). While an orthodox way of studying new communication technologies, like the telephone, involves examining how the new machine or instrument may introduce new practices and contribute to the building of new social relationships, Marvin sees new media as 'providing new platforms on which old groups confront one other'. The appearance of a new medium becomes a kind of occasion for a 'drama', whereby the existing groups and hierarchies within a society attempt to assimilate the new technology into their familiar worlds, rituals and habits. On the one hand, a society works to use the new technology to fulfil old and existing social functions, while at the same time it projects onto the technology its fears about its own stability and already existing social tensions.

Marvin shows how a technological imaginary is at work long before a new communications technology settles into a stable form. The new groups of 'experts' and professionals who formed around new media technologies, with their particular visions and imaginaries (such as Negrofonte or the French HDTV researchers discussed in **Case study 1.7**), are only one group in a wider society that seeks to experiment with and imagine the possibilities of the new medium in order to 'reduce and simplify a world of expanding cultural variety to something more familiar and less threatening' (1988: 5).

CASE STUDY 1.6: The technological imaginary and the cultural reception of new media

Television and the gendering of a 'bad' object

Key text: William Boddy (1994) 'Archaeologies of electronic vision and the gendered spectator', *Screen* 35.2 (Summer): 105–122.

the . . . exploration of the history of technology is more than technical . . . technology can reveal the dream world of society as much as its pragmatic realisation.

(Gunning, quoted in Boddy 1994: 105)

William Boddy has adopted Marvin's approach to examine how, earlier in the twentieth century, a technological imaginary shaped our perceptions of radio and television in ways which now inform our ideas about the value of new digital media.

Radio and, later, television were media technologies that had to be 'filled' with content after they were designed (Williams 1974: 25). With its beginnings in the transmission of 'one-to-one' secret messages for military and trading purposes, radio started its civil life in the 'attic' as a hobby or an enthusiast's activity. In the 1920s radio receivers of various kinds of complexity were self-assembled by men and boys from parts and kits. Isolated from the rest of the family by their headphones, these male enthusiasts 'fished' the airwaves. 'The radio enthusiasts . . . envisioned radio as an active sport . . . in which the participant gained a sense of mastery – increased masculinity – by adjusting the dials and "reeling" in the distant signals' (Spiegel 1992: 27). This was a gendered activity, being almost exclusively pursued by men. During this period radio was also hailed for its potential social good. A medium to weld a nation together in solidarity, and to build community where none existed or where it was threatened by racist tensions (the parallels with the Internet are strong).

From the mid-1920s, in the US and Europe, sound broadcasting was transformed by investment in the production of 'user friendly' domestic receivers in order to open up the growing markets for consumer durables in the family home – the box camera, washing machine, the gas range, and the vacuum cleaner. There was a determined attempt on the part of broadcasters and hardware manufacturers to shift the popular perception of the radio away from an untidy mass of wires, valves and acid-filled batteries used in intense isolation by men in their attics. Instead it was marketed as a piece of furniture suitable for siting in the living room and audible through camouflaged speakers. Radio came to be perceived as background atmosphere, a cosmetic domestic addition to furniture and wall-paper, for the distracted housewife (Boddy 1994: 114). As a 1923 trade journal advised the retailers who were to sell the new sets, 'don't talk circuits. Don't talk in electrical terms . . . You must convince everyone . . . that radio will fit into the well appointed home' (Boddy 1994: 112).

The reaction of the male radio enthusiast was predictable (and foreshadows that of the hackerish Internet users' response to the mid-1990s emergence of the commercialised, animated banner-ad commodification of the 'information wants to be free' Internet). Radio amateurs bemoaned the loss of an engrossing hobby and the thrilling business of 'conquering time and space', while wrestling ingeniously with the technology (Boddy 1994: 113).

Instead, with the 'distracted housewife' as the ideal audience, radio came to be seen as 'passive listening', a matter of 'mere' enjoyment. A commercialised, trivial regime of 'programmes' aimed at an 'average woman listener [who] is neither cosmopolitan nor sophisticated. Nor does she have much imagination' (Boddy 1994: 114). Fears grew that radio would isolate and lead to the stagnation of family life. After its heroic 'attic days' radio was judged to have become a pacifying, emasculating and feminising activity.

CASE STUDY 1.7: The technological imaginary and the shaping of new media

Key text: Patrice Flichy (1999) 'The construction of new digital media', *New Media and Society* 1.1: 33–39.

communication technologies, in particular, like network technologies, are often the source of an abundant production by the collective imagination . . . in which innovations are celebrated by the media even before being launched.

(Flichy 1999: 33)

Patrice Flichy proposes that the technological imaginary plays a role in the very creation of a new medium. It is a factor that interplays with actual technological developments, planning, and the lifestyles and modes of work into which the technology is designed to fit. It is an element which owes more to certain ideologies and desires that circulate within a culture than to hard-headed calculations and credible expectations of how a medium is likely to be used (Flichy 1999: 34). Flichy uses recent debates over the future of digital television as one of his examples (see also Winston 1996). In the 1990s three views on how digitisation should be applied to the medium of television competed with each other. These were:

- HDTV (high-definition digital television)
- personalised, interactive television (push media)
- multi-channel cable and satellite television

HDTV involved the use of digitisation to give television a high-resolution image. This was, initially, a primarily European concept and Flichy traces it to a French habit of thinking of television 'cinematographically'; that is, rather than thinking of television in terms of its flow of images, to be preoccupied instead with the quality of the framed image 'on the screen'.

The second conception, that championed by Nicolas Negroponte, the 'digital guru' from MIT, envisions the future of TV as a 'gigantic virtual video library' delivering personalised contents to its interacting users. This concept of TV as breaking free of linear, centralised programming and scheduling, and emphasising 'user choice', is related to a sort of interactive 'essence' of digital technology (1.2).

The third option, to use increased digital bandwidth to multiply the number of TV channels, is technologically and economically driven in the sense that it builds upon previous corporate investments in cable and satellite transmission. This option, which in many ways is to 'provide more of the same', now appears to be the direction actually being taken by the early operators of digital television.

The degree to which each of these visions of what television 'could be' has been subsequently realised is not at issue. The point is that such visions are driven by cultural values upon which a technological imaginary is based and not on technological necessities; it is possible that the technology could deliver any or all of the options.

The debate and practical competition over how to employ digital technology in relation to the existing medium of television was based upon three kinds of technological imaginary: the desire to elevate television to the status of cinema by providing it with the detail and beauty of the film image; a conviction that television should be radically transformed in line with the new principles of digital culture; and, finally, the profit-driven ambition to use technology to provide more of the same while creating more television 'niche' markets.

The examples above argue that the processes that determine the kind of media we actually get are neither solely economic nor solely technological, but that all orders of decision in the development process occur within a discursive framework powerfully shaped by the technological imaginary. The evidence for the existence of such a framework can be tracked back through the introduction of numerous technologies and goods throughout the modern period.

1.5.4 The return of the Frankfurt School critique in the popularisation of new media

We now return to a broader consideration of the points raised in **Case study 1.3** concerning the allegedly 'democratic' potential of interactivity. Here, however, we point out how a tradition of criticism of mass media finds itself reappropriated as another discursive framework that shapes our ideas about what new media are or could be.

This tradition of media critique expressed profound dissatisfaction with the uses and the cultural and political implications of broadcast media throughout the early and mid-twentieth century. Such critics of the effects of twentieth-century mass media did not normally think that there was a technological solution to the problems they identified. They did not suggest that new and different media technologies would overcome the social and cultural problems they associated with the media they were familiar with. To the extent that they could conceive of change in their situation they saw hope lying in social action, whether through political revolution or a conservative defence of threatened values. In another tradition it was more imaginative and democratic uses of existing media that were seen as the answer. Nevertheless, the critique of mass media has become, in the hands of new media enthusiasts, a set of terms against which new media are celebrated. The positions and theories represented by these media critics have been frequently rehearsed and continue to be influential in some areas of media studies and theory. Because of this they need not be dealt with at great length here as many accessible and adequate accounts already exist (Strinati 1995; Stevenson 1995; Lury 1992).

The 'culture industry', the end of democratic participation and critical distance

From the 1920s until the present day the mass media (especially the popular press and the broadcast media of radio and television) have been the object of sustained criticism from intellectuals, artists, educationalists, feminists and left-wing activists. It is a (contentious) aspect of this critique, which sees mass culture as disempowering, homogenising, and impositional in nature, that is of relevance in this context. Strinati sums up such a view:

[there] is a specific conception of the audience of mass culture, the mass or the public which consumes mass produced cultural products. The audience is conceived of as a mass of passive consumers . . . supine before the false pleasures of mass consumption . . . The picture is of a mass which almost without thinking, without reflecting, abandoning all critical hope, buys into mass culture and mass consumption. Due to the emergence of mass society and mass culture it lacks the intellectual and moral resources to do otherwise. It cannot think of, or in terms of, alternatives.

(Strinati 1995: 12)

Such a conception and evaluation of the 'mass' and its culture was argued by intellectuals who were steeped in the values of a literary culture. Alan Meek has described well a dominant kind of relationship which such intellectuals and artists had to the mass media in the early and mid-twentieth century:

The modern Western intellectual appeared as a figure within the public sphere whose technological media was print and whose institutions were defined by the nation state. The ideals of democratic participation and critical literacy which the intellectual espoused

have often been seen to be undermined by the emerging apparatus of electronic media, 'mass culture', or the entertainment industry.

(Meek 2000: 88)

Mass society critics feared four things:

- the debasement and displacement of an authentic organic folk culture;
- the erosion of high cultural traditions, those of art and literature;
- loss of the ability of these cultural traditions (as the classical 'public sphere') to comment critically on society's values;
- the indoctrination and manipulation of the 'masses' by either totalitarian politics or market forces.

The context within which these fears were articulated was the rise of mass, urban society. Nineteenth- and early twentieth-century industrialisation and urbanisation in Western Europe and America had weakened or destroyed organic, closely knit, agrarian communities. The sense of identity, community membership and oral, face-to-face communication fostered and mediated by institutions like the extended family, the village, and the Church were seen to be replaced by a collection of atomised individuals in the new industrial cities and workplaces. At the same time the production of culture itself became subject to the processes of industrialisation and the marketplace. The evolving Hollywood mode of film production, popular 'pulp' fiction, and popular music were particular objects of criticism. Seen as generic and formulaic, catering to the lowest common denominators of taste, they were assembly line models of cultural production. Radio, and later television, were viewed as centralised impositions from above. Either as a means of trivialising the content of communication, or as a means of political indoctrination, they were seen as threats to democracy and the informed critical participation of the masses in cultural and social life. How, feared the intellectuals, given the burgeoning of mass electronic media, could people take a part in a democratic system of government in which all citizens are active, through their elected representatives, in the decisions a society makes?

With the erosion of folk wisdom and morality, and the trivialisation, commercialisation and centralisation of culture and communications, how could citizens be informed about issues and able, through their educated ability, to think independently and form views on social and political issues? Critical participation demanded an ability and energy to take issue with how things are, to ask questions about the nature or order of things, and a capacity to envision and conceive of better states as a guide to action. In the eyes of theorists such as those of the Frankfurt School, such ideals were terminally threatened by the mass media and mass culture.

Further, such developments took place in the context of twin evils. First, the twin realities of Fascism and Stalinism which demonstrated the power of mass media harnessed to totalitarianism. Second, the tyranny of market forces to generate false needs and desires within the populations of capitalist societies where active citizens were being transformed into 'mere' consumers.

This 'mass society theory', and its related critiques of the mass media, has been much debated, challenged and qualified within media sociology, **ethnography**, and in the light of postmodern media theory in recent years (see, for example, our discussion of audience interaction with mass media texts in **Case study 1.3**). Despite the existence of more nuanced accounts of the mass media which offer a more complex view of their social significance, it

has now become clear that some of the main proponents of the twenty-first century's new communications media are actually celebrating their potential to restore society to a state where the damage perceived to be wrought by mass media will be undone. In some versions there is an active looking back to a pre-mass culture golden age of authentic exchange and community. We can especially note the following:

- The recovery of community and a sphere of public debate. In this formulation the Internet is seen as providing a vibrant counter public sphere. In addition, shared online spaces allegedly provide a sense of 'cyber community' against the alienations of contemporary life.
- The removal of information and communication from central authority, control and censorship.
- The 'fourth estate' function of mass media, seen here to be revived with the rise of the 'citizen journalist' as alternative sources of news and information circulate freely through 'blogs', online publishing, camera-phone photography etc.
- The creative exploration of new forms of identity and relationship within virtual communities and social networking sites.

Online communication is here seen as productive not of 'passive' supine subjects but of an active process of identity construction and exchange. These arguments all in some way echo and answer ways in which conventional mass media have been problematised by intellectuals and critics.

The Brechtian avant-garde and lost opportunities

These 'answers' to a widespread pessimism about mass media can be seen in the light of another tradition in which the emancipatory power of radio, cinema, and television (also the mass press) lay in the way that they promised to involve the workers of industrial society in creative production, self-education and political expression. A major representative of this view is the socialist playwright Bertolt Brecht. Brecht castigated the form that radio was taking in the 1930s as he saw its potentials being limited to 'prettifying public life' and to 'bringing back cosiness to the home and making family life bearable'. His alternative, however, was not the male hobby, as described by Boddy above (**Case study 1.6**), but a radical practice of exchange and networking. It is interesting to listen to his vision of radio conceived as a 'vast network' in 1932:

radio is one-sided when it should be two. It is purely an apparatus for distribution, for mere sharing out. So here is a positive suggestion: change this apparatus over from distribution to communication. The radio would be the finest possible communication apparatus in public life, a vast network of pipes. That is to say, it would be if it knew how to receive as well as submit, how to let the listener speak as well as hear, how to bring him into a relationship instead of isolating him.

(Brecht 1936, in Hanhardt 1986: 53)

Brecht's cultural politics have lain behind radical movements in theatre, photography, television and video production from the 1930s to the 1980s. In a final or latest resurgence they now inform politicised ideas about the uses of new media. Here it is argued that new media can be used as essentially two-way channels of communication that lie outside of official

control. Combined with mobile telephony and digital video anti-capitalist demonstrators are now able to webcast near live information from their actions, beating news crews to the action and the transmission.

Finally, it is necessary to mention the influential ideas of a peripheral member of the Frankfurt School, Walter Benjamin. He took issue, in some of his writing, with the cultural pessimism of his colleagues. In 'The Work of Art in the Age of Mechanical Reproduction', and 'The Author As Producer', he argues that photography, film, and the modern newspaper, as media of mass reproduction, have revolutionary potential. Benjamin roots his argument in noticing some of the distinctive characteristics of these media, and the implications that he draws from them can be heard to echo today in the more sanguine estimations of the potential of new (digital) media. However, Benjamin sees that whether or not this potential will be realised is finally a matter of politics and not technology.

1.5.5 Conclusion

Section 5 has served to illustrate how the debates about new media, what it is, what it might be, what we would like it to be, rehearse many positions that have already been established within media studies and critical theory. Though the debates above are largely framed in terms of the amazing novelty of the possibilities that are opening up, they in fact revisit ground already well trodden. The disavowal of the history of new media thus appears as an ideological sleight of hand that recruits us to their essential value but fails to help us understand what is happening around us.

1.6 New media: determining or determined?

In previous sections of Part 1 of this book we have been looking at what kinds of histories, definitions and discourses shape the way we think about new media. We begin this final section by turning to examine two apparently competing paradigms, or two distinct approaches to the study of media, both of which underlie different parts of what will follow in this volume.

At the centre of each of these paradigms is a very different understanding of the power media and technology have to determine culture and society. The long-standing question of whether or not a media technology has the power to transform a culture has been given a very high profile with the development of new media. It will repay the good deal of attention that we give it here and in Part 5. In this section we will investigate this issue and the debates that surround it by turning back to the writings of two key but very different theorists of media: Marshall McLuhan and Raymond Williams. It is their views and arguments about the issue, filtered through very different routes, that now echo in the debate between those who see new media as revolutionary or as 'business as usual' that we pointed to in (1.1).

Although both authors more or less ceased writing at the point where the PC was about to 'take off' their analysis of the relationships between technology, culture and media continues to resonate in contemporary thought. As media theorists, both were interested in new media. It is precisely McLuhan's interest to identify and 'probe' what he saw as big cultural shifts brought about by change in media technologies. Williams, too, speaks of 'new media' and is interested in the conditions of their emergence and their subsequent use and control. While McLuhan was wholly concerned with identifying the major cultural effects that he saw new technological forms (in history and in his present) bringing about, Williams sought to show that there is nothing in a particular technology which guarantees the cultural or social outcomes it will have (Williams 1983: 130). McLuhan's arguments are at the core of claims

that 'new media change everything'. If, as McLuhan argued, media determine consciousness then clearly we are living through times of profound change. On the other hand, albeit in a somewhat reduced way, the 'business as usual' camp is deeply indebted to Williams for the way in which they argue that media can only take effect through already present social processes and structures and will therefore reproduce existing patterns of use and basically sustain existing power relations.

1.6.1 The status of McLuhan and Williams

In the mainstream of media studies and much cultural studies the part played by the technological element that any medium has is always strongly qualified. Any idea that a medium can be reduced to a technology, or that the technological element which is admitted to be a part of any media process should be central to its study, is strongly resisted. The grounds for this view are to be found in a number of seminal essays by Raymond Williams (1974: 9–31; 1977: 158–164; 1983: 128–153), which, at least in part, responded critically to the 'potent observations' (Hall 1975: 81) of the Canadian literary and media theorist Marshall McLuhan. Williams's arguments against McLuhan subsequently became touchstones for media studies' rejection of any kind of **technological determinism**.

Yet, and here we meet one of the main sources of the present clash of discourses around the significance of new media, McLuhan's ideas have undergone a renaissance – literally a rebirth or rediscovery – in the hands of contemporary commentators, both popular and academic, on new media. The **McLuhanite** insistence on the need for new non-linear ('mosaic' is his term) ways of thinking about new media, which escape the intellectual protocols, procedures and habits of a linear print culture, has been taken up as something of a war cry against the academic media analyst. The charge that the neo-McLuhan cybertheorists make about media studies is made at this fundamental, epistemological level; that they simply fail to realise that its viewpoints (something, in fact, that McLuhan would claim we can no longer have) and methodologies have been hopelessly outstripped by events. As an early critic of McLuhan realised, to disagree with McLuhanite thinking is likely to be seen as the product of 'an outmoded insistence on the logical, ABCD minded, causality mad, one-thing-at-a-time method that the electronic age and its prophet have rendered obsolete' (Duffy 1969: 31).

Both Williams and McLuhan carried out their influential work in the 1960s and 1970s. Williams was one of the founding figures of British media and cultural studies. His rich, if at times abstract, historical and sociological formulations about cultural production and society provided some of the master templates for what has become mainstream media studies. Countless detailed studies of all kinds of media are guided and informed by his careful and penetrating outlines for a theory of media as a form of cultural production. His work is so deeply assimilated within the media studies discipline that he is seldom explicitly cited; he has become an invisible presence. Wherever we consider, in this book, new media as subject to control and direction by human institutions, skill, creativity and intention, we are building upon such a Williamsite emphasis.

On the other hand, McLuhan, the provoking, contentious figure who gained almost pop status in the 1960s, was discredited for his untenable pronouncements and was swatted away like an irritating fly by the critiques of Williams and others (see Miller 1971). However, as Williams foresaw (1974: 128), McLuhan has found highly influential followers. Many of his ideas have been taken up and developed by a whole range of theorists with an interest in new media: Baudrillard, Virilio, Poster, Kroker, De Kerckhove. The work of McLuhan and his followers has great appeal for those who see new media as bringing about radical cultural

change or have some special interest in celebrating its potential. For the electronic counter-culture he is an oppositional figure and for corporate business a source of propaganda – his aphorisms, ‘the global village’ and ‘the medium is the message’, ‘function as globally recognised jingles’ for multinational trade in digital commodities (Genosko 1998). The magazine *Wired* has adopted him as its ‘patron saint’ (*Wired*, January 1996).

Williams’s insights, embedded in a grounded and systematic theory, have been a major, shaping contribution to the constitution of an academic discipline. McLuhan’s elliptical, unsystematic, contradictory and playful insights have fired the thought, the distinctive stance, and the methodological strategies of diverse but influential theorists of new media. We might say that Williams’s thought is structured into media studies while, with respect to this discipline, McLuhan and those who have developed his ideas stalk its margins, sniping and provoking in ways that ensure they are frequently, if sometimes begrudgingly, referenced. Even cautious media academics allow McLuhan a little nowadays. He is seen as a theoretically unsubtle and inconsistent thinker who provokes others to think (Silverstone 1999: 21). It matters if he is wrong. One or another of his insights is often the jumping-off point for a contemporary study.

McLuhan’s major publications appeared in the 1960s, some two decades before the effective emergence of the PC as a technology for communications and media production. It is a shift from a 500-year-old print culture to one of ‘electric’ media, by which he mainly means radio and television, that McLuhan considers. He only knew computers in the form of the mainframe computers of his day, yet they formed part of his bigger concept of the ‘electric environment’, and he was sharp enough to see the practice of timesharing on these machines as the early signs of their social availability. By the 1990s, for some, McLuhan’s ideas, when applied to developments in new media, had come to seem not only potent but extraordinarily prescient as well. It is quite easy to imagine a student at work in some future time, who, failing to take note of McLuhan’s dates, is convinced that he is a 1990s writer on cyberculture, a contemporary of Jean Baudrillard or William Gibson. While this may owe something to the way that his ideas have been taken up in the postmodern context of the last two decades of the twentieth century by writers such as Baudrillard, Virilio, De Kerckhove, Kroker, Kelly, and Toffler, this hardly undermines the challenging and deliberately perverse originality of his thought.

The debate between the Williams and McLuhan positions, and Williams’s apparent victory in this debate, left media studies with a legacy. It has had the effect of putting paid to any ‘good-sense’ cultural or media theorist raising the spectre of the technological determinism associated with the thought of McLuhan. It has also had the effect of foreclosing aspects of the way in which cultural and media studies deals with technology by implicitly arguing that technology on its own is incapable of producing change, the view being that whatever is going on around us in terms of rapid technological change there are rational and manipulative interests at work driving the technology in particular directions and it is to these that we should primarily direct our attention. Such is the dismissal of the role of technology in cultural change that, should we wish to confront this situation, we are inevitably faced with our views being reduced to apparent absurdity: ‘What!? Are you suggesting that machines can and do act, cause things to happen on their own? – that a machine caused space flight, rather than the superpowers’ ideological struggle for achievement?’

However, there are good reasons to believe that technology cannot be adequately analysed only within the **humanist** frame Williams bequeathed cultural and media theorists. Arguments about what causes technological change may not be so straightforward as culturalist accusations of political or theoretical naivety seem to suggest. In this section, therefore, we review Williams’s and McLuhan’s arguments about media and technology. We

Eventually the intellectual distance between Williams and McLuhan was great, but this was not always so. In a review of McLuhan’s *Gutenberg Galaxy*, published in 1962, Williams writes of his preoccupation with the book (Stearn 1968: 188). He considers it to be ‘a wholly indispensable work’. It was a work that stayed in his mind for months after he first read it and to which he returned frequently; but he was already uneasy about McLuhan’s singling out of the medium of print as the single causal factor in social change (Stearn 1968: 190). However, by 1974 his estimation of McLuhan’s importance had deteriorated markedly. He saw McLuhan’s projection of totalising images of society – its ‘retribalisation’, the electronic age, ‘the global village’ – projected from his ‘unhistorical and asocial’ study of media as ‘ludicrous’ (Stearn 1968: 128).

then examine the limits of the humanist account of technology that Williams so influentially offered and ask whether he was correct in his dismissal of McLuhan as a crude technological determinist. Finally, we explore other important nonhumanist accounts of technology that are frequently excluded from the contemporary study of media technologies. The latter are then more fully elaborated in Part 5.

Humanism

'Humanism' is a term applied to a long and recurring tendency in Western thought. It appears to have its origins in the fifteenth- and sixteenth-century Italian Renaissance where a number of scholars (Bruno, Erasmus, Valla, and Pico della Mirandola) worked to recover elements of classical learning and natural science lost in the 'dark ages' of the medieval Christian world. Their emphasis on explaining the world through the human capacity for rational thought rather than a reliance on Christian theology fostered the '[b]elief that individual human beings are the fundamental source of all value and have the ability to understand – and perhaps even to control – the natural world by careful application of their own rational faculties' (*Oxford Companion to Philosophy*). This impetus was added to and modified many times in following centuries. Of note is the seventeenth-century Cartesian idea of the human subject, 'I think, therefore I am. I have intentions, purposes, goals, therefore I am the sole source and free agent of my actions' (Sarup 1988: 84). There is a specifically 'Marxist humanism' in the sense that it is believed that self-aware, thinking and acting individuals will build a rational socialist society. For our purposes here it is important to stress that a humanist theory tends only to recognise human individuals as having agency (and power and responsibility) over the social forms and the technologies they create and, even, through rational science, the power to control and shape nature.

1.6.2 Mapping Marshall McLuhan

Many of McLuhan's more important ideas arise within a kind of narrative of redemption. There is little doubt that much of McLuhan's appeal to new media and cyber enthusiasts lies in the way that he sees the arrival of an 'electronic culture' as a rescue or recovery from the fragmenting effects of 400 years of print culture. McLuhan has, indeed, provided a range of ideological resources for the technological imaginary of the new millennium.

Here, we outline McLuhan's grand schema of four cultures, determined by their media forms, as it is the context in which some important ideas arise; ideas which are, arguably, far more important and useful than his quasi-historical and extremely sweeping narrative. We then concentrate on three key ideas. First, 'remediation', a concept that is currently much in vogue and finds its roots in McLuhan's view that 'the content of any medium is always another medium' (1968: 15–16). Second, his idea that media and technologies are extensions of the human body and its senses. Third, his famous (or notorious) view that 'the medium is the message'. This section is the basis for a further discussion, in **1.6.4**, of three 'theses' to be found in McLuhan's work: his extension thesis, his environmental thesis, and his anti-content thesis.

A narrative of redemption

McLuhan's view of media as technological extensions of the body is his basis for conceiving of four media cultures which are brought about by shifts from oral to written communication,

from script to print, and from print to electronic media. These four cultures are: (1) a primitive culture of oral communication, (2) a literate culture using the phonetic alphabet and hand-written script which co-existed with the oral, (3) the age of mass-produced, mechanical printing (*The Gutenberg Galaxy*), and (4) the culture of 'electric media': radio, television, and computers.

'PRIMITIVE' ORAL/AURAL CULTURE

In pre-literate 'primitive' cultures there was a greater dominance of the sense of hearing than in literate cultures when, following the invention of the phonetic alphabet (a visual encoding of speech), the ratio of the eye and the ear was in a better state of equilibrium. Pre-literate people lived in an environment totally dominated by the sense of hearing. Oral and aural communication were central. Speaking and hearing speech was the 'ear-man's' main form of communication (while also, no doubt, staying alert to the sound of a breaking twig!). McLuhan is not enthusiastic about this kind of culture. For him it was not a state of 'noble savagery' (Duffy 1969: 26).

Primitive man lived in a much more tyrannical cosmic machine than Western literate man has ever invented. The world of the ear is more embracing and inclusive than that of the eye can ever be. The ear is hypersensitive. The eye is cool and detached. The ear turns man over to universal panic while the eye, extended by literacy and mechanical time, leaves some gaps and some islands free from the unremitting acoustic pressure and reverberation.

(McLuhan 1968: 168)

THE CULTURE OF LITERACY

McLuhan says that he is not interested in making judgements but only in identifying the configurations of different societies (1968: 94). However, as is implied in the above passage, for McLuhan the second culture, the culture of literacy, was an improvement on pre-literate, oral culture. For here, via the alphabet and writing, as extensions of the eye, and, in its later stages, the clock, 'the visual and uniform fragmentation of time became possible' (1968: 159). This released 'man' from the panic of 'primitive' conditions while maintaining a balance between the aural and the visual. In the literate, scribal culture of the Middle Ages McLuhan sees a situation where oral traditions coexisted alongside writing: manuscripts were individually produced and annotated by hand as if in a continual dialogue, writers and readers were hardly separable, words were read aloud to 'audiences', and the mass reproduction of uniform texts by printing presses had not led to a narrowing dominance and authority of sight over hearing and speaking. Writing augmented this culture in specialised ways without wholly alienating its members from humankind's original, participatory, audio-tactile universe (Theal 1995: 81).

PRINT CULTURE

For McLuhan, the real villain of the piece is print culture – the Gutenberg Galaxy with its 'typographic man', where the sensory alienation which was avoided in literate culture occurs. Here we meet the now familiar story of how the mass reproduction of writing by the printing press, the development of perspectival images, the emerging scientific methods of observation and measurement, and the seeking of linear chains of cause and effect came to dominate modern, rationalist print culture. In this process its members lost their tactile and auditory relation with the world, their rich sensory lives were fragmented and impoverished as the visual

sense dominated. In McLuhan's terms this is a culture in which the 'stepping up of the visual component in experience . . . filled the field of attention' (1962: 17). The culture was hypnotised by vision (mainly through its extensions as typography and print) and the 'interplay of all the senses in haptic harmony' dies. Fixed points of view and measured, separating distances come to structure the human subject's relation to the world. With this 'instressed concern with one sense only, the mechanical principle of abstraction and repetition emerges', which means 'the spelling out of one thing at a time, one sense at a time, one mental or physical operation at a time' (1962: 18). If the primitive pre-literate culture was tyrannised by the ear, Gutenberg culture is hypnotised by its eye.

McLuhan's ideas about television received very short shrift from British cultural and media studies, even in its formative period (see Hall 1975)

ELECTRONIC CULTURE

The fourth culture, electronic culture, is 'paradise regained' (Duffy 1969). Developing from the invention of telegraphy to television and the computer, this culture promises to short-circuit that of mechanical print and we regain the conditions of an oral culture in acoustic space. We return to a state of sensory grace; to a culture marked by qualities of simultaneity, indivisibility and sensory plenitude. The haptic or tactile senses again come into play, and McLuhan strives hard to show how television is a tactile medium.

The terms in which McLuhan described this electric age as a new kind of primitivism, with tribal-like participation in the 'global village', resonates with certain strands of New Age media culture. McLuhan's all-at-onceness or simultaneity, the involvement of everyone with everyone, electronic media's supposedly connecting and unifying characteristics, are easy to recognise in (indeed, in some cases have led to) many of the terms now used to characterise new media – connectivity, convergence, the network society, wired culture, and interaction.

- 1.1.4 Non-technical and inclusive
- 1.3 Change and continuity

Remediation (see also 1.1.4 and 1.3)

First, and most uncontentiously because it was an idea that McLuhan and Williams shared, is the idea that all new media 'remediate' the content of previous media. This notion, as developed by McLuhan in the 1960s, has become a key idea, extensively worked out in a recent book on new media. In *Remediation: Understanding New Media* (1999), Jay David Bolter and Richard Grusin briefly revisit the clash between Williams and McLuhan as they set out their own approach to the study of new media. They define a medium as 'that which remediates'. That is, a new medium 'appropriates the techniques, forms, and social significance of other media and attempts to rival or refashion them in the name of the real' (ibid.: 65). The inventors, users, and economic backers of a new medium present it as able to represent the world in more realistic and authentic ways than previous media forms, and in the process what is real and authentic is redefined (ibid.). This idea owes something to McLuhan, for whom 'the "content" of any medium is always another medium' (1968: 15–16).

See Williams (1974) on music hall and parlour games in broadcasting

Bolter and Grusin have something interesting to say about Williams and McLuhan which bears directly upon our attempt to get beyond the polarised debates about new media. They agree with Williams's criticism that McLuhan is a technological determinist who single-mindedly took the view that media technologies act directly to change a society and a culture, but they argue that it is possible to put McLuhan's 'determinism' aside in order to appreciate 'his analysis of the remediating power of various media'. Bolter and Grusin encourage us to see value in the way that McLuhan 'notices intricate correspondences involving media and cultural artefacts' (1999: 76), and they urge us to recognise that his view of media as 'extensions of the human sensorium' has been highly influential, prefiguring the concept of the **cyborg** in late twentieth-century thought on media and cyberspace or technoculture. It is

precisely this ground, and the question of the relationship between human agency and technology in the age of cybernetic culture, which the neo-McLuhanites attempt to map.

Extending the sensorium

McLuhan reminds us of the technological dimension of media. He does so by refusing any distinction between a medium and a technology. For him, there is no issue. It is not accidental that he makes his basic case for a medium being 'any extension of ourselves' (1968: 15) by using as key examples the electric light (*ibid.*) and the wheel (*ibid.*: 52) – respectively a system and an artefact which we would ordinarily think of as technologies rather than media. Basically, this is no more than the commonplace idea that a 'tool' (a name for a simple technology) is a bodily extension: a hammer is an extension of the arm or a screwdriver is an extension of the hand and wrist.

In *The Medium is the Massage* (McLuhan and Fiore 1967a) McLuhan drives this point home. We again meet the wheel as 'an extension of the foot', while the book is 'an extension of the eye', clothing is an extension of the skin, and electric circuitry is an 'extension of the central nervous system'. In other places he speaks of money (1968: 142) or gunpowder (*ibid.*: 21) as a medium. In each case, then, an artefact is seen as extending a part of the body, a limb or the nervous system. And, as far as McLuhan is concerned, these are 'media'.

McLuhan conflates technologies and mediums in this way because he views both as part of a larger class of things; as extensions of the human senses: sight, hearing, touch, and smell. Wheels for instance, especially when driven by automotive power, radically changed the experience of travel and speed, the body's relationship to its physical environment, and to time and space. The difference between the view we have of the world when slowly walking, open on all sides to a multisensory environment, or when glimpsed as rapid and continuous change through the hermetically sealed and framing window of a high-speed train, is a change in sensory experience which did and continues to have cultural significance. (See, for instance, Schivelbusch 1977.) It is this broadening of the concept of a medium to all kinds of technologies that enabled McLuhan to make one of his central claims: that the 'medium is the message'. In understanding media, it matters not, he would claim, why we are taking a train journey, or where we are going on the train. These are irrelevant side issues which only divert us from noticing the train's real cultural significance. Its real significance (the message of the medium itself) is the way it changes our perception of the world.

McLuhan also asserts (he doesn't 'argue') that such extensions of our bodies, placed in the context of the body's whole range of senses (the sensorium), change the 'natural' relationships between the sensing parts of the body, and affect 'the whole psychic and social complex' (1968: 11). In short, he is claiming that such technological extensions of our bodies affect both our minds and our societies. In *The Gutenberg Galaxy* (1962: 24) he expresses the idea of technological extension more carefully when he says, 'Sense ratios change when any one sense or bodily or mental function is externalised in technological form.' So, for McLuhan, the importance of a medium (seen as a bodily extension) is not just a matter of a limb or anatomical system being physically extended (as in the hammer as 'tool' sense). It is also a matter of altering the 'ratio' between the range of human senses (sight, hearing, touch, smell) and this has implications for our 'mental functions' (having ideas, perceptions, emotions, experiences, etc.).

Media, then, change the relationship of the human body and its sensorium to its environment. Media generally alter the human being's sensory relationship to the world, and the specific characteristics of any one medium change that relationship in different ways. This is McLuhan's broad and uncontested premiss upon which he spins all manner of these –

There is also an important reversal of this idea as with industrial mechanisation we come to think of the human body as a mere extension of the machine. An idea powerfully represented by Charlie Chaplin in *Modern Times* and theorised by Marx and Benjamin amongst others (see also 1.6.4)

some far more acceptable than others. It is not hard to see how such a premiss or idea has become important at a time of new media technologies and emergent new media forms.

The medium is the message

As we saw above, in what has been widely condemned as an insupportable overstatement, McLuhan concludes from his idea of media as extensions of man that 'understanding media' has nothing to do with attending to their content. In fact he maintains that understanding is blocked by any preoccupation with media content and the specific intentions of media producers. He views the 'conventional response to all media, namely that it is how they are used that counts', as 'the numb stance of the technological idiot. For the "content" of a medium is like the juicy piece of meat carried by the burglar to distract the watchdog of the mind' (1968: 26).

McLuhan will have no truck with questions of intention whether on the part of producers or consumers of media. In a seldom referred to but telling passage in *Understanding Media* (1968: 62) he makes it clear that 'It is the peculiar bias of those who operate the media for the owners that they be concerned about program content.' The owners themselves 'are more concerned about the media as such'. They know that the power of media 'has little to do with "content"'. He implies that the owner's preoccupation with the formula 'what the public wants' is a thin disguise for their knowing lack of interest in specific contents and their strong sense of where the media's power lies.

Hence his deliberately provocative slogan 'The medium is the message'. This is where his use of the electric light as a 'medium' pays off. It becomes the exemplary case of a 'medium without a message' (1968: 15). McLuhan asserts that neither the (apparent and irrelevant) messages that it carries (the words and meanings of an illuminated sign) nor its uses (illuminating baseball matches or operating theatres) are what is important about electric light as a medium. Rather, like electricity itself, its real message is the way that it extends and speeds up forms of 'human association and action', whatever they are (1968: 16). What is important about electric light for McLuhan is the way that it ended any strict distinction between night and day, indoors and outdoors and how it then changed the meanings (remediated) of already existing technologies and the kinds of human organisation built around them: cars can travel and sports events can take place at night, factories can operate efficiently around the clock, and buildings no longer require windows (1968: 62). For McLuhan, the real "message" of any medium or technology is the change of scale or pace or pattern that it introduces into human affairs' (1968: 16). Driving his point home, and again moving from technology to communication media, he writes:

The message of the electric light is like the message of electric power in industry. Totally radical, pervasive, and decentralised. For the electric light and power are separate from their uses, yet they eliminate time and space factors in human association exactly as do radio, telegraph, telephone and TV, creating involvement in depth.

(McLuhan 1968: 17)

Also, like the effects of the electric light on the automobile, McLuhan claims that the content of any medium is another medium which it picks up and works over (the medium is the message).

McLuhan's absolute insistence on the irrelevance of content to understanding media needs to be seen as a strategy. He adopts it in order to focus his readers upon:

- 1 the power of media technologies to structure social arrangements and relationships, and
- 2 the mediating aesthetic properties of a media technology. They mediate our relations to one another and to the world (electronic broadcasting as against one-to-one oral communication or point-to-point telegraphic communication for instance). Aesthetically, because they claim our senses in different ways, the multidirectional simultaneity of sound as against the exclusively focused attention of a 'line' of sight, the fixed, segmenting linearity of printed language, the high resolution of film or the low resolution of TV, etc.

It is McLuhan's view that these mediating factors are qualities of the media technologies themselves, rather than outcomes of the way they are used, which is criticised by Williams and many in media studies

We should now be in a better position to see what McLuhan offers us in our efforts to 'understand new media', and why his work has been seen to be newly important in the context of new media technologies:

- McLuhan stresses the physicality of technology, its power to structure or restructure how human beings pursue their activities, and the manner in which extensive technological systems form an environment in which human beings live and act. Conventional wisdom says that technology is nothing until it is given cultural meaning, and that it is what we do with technologies rather than what they do to us that is important and has a bearing on social and cultural change. However, McLuhan's project is to force us to reconsider this conventional wisdom by recognising that technology also has an agency and effects that cannot be reduced to its social uses.
- In his conception of media as technological extensions of the body and its senses, as 'outerings' of what the body itself once enclosed, he anticipates the networked, converging, cybernetic media technologies of the late twentieth/early twenty-first centuries. He also distinguishes them from earlier technologies as being more environmental. In his words, 'With the arrival of electric technology, man extended, or set outside himself, a live model of the central nervous system itself' (1968: 53). This is qualitatively different from previous kinds of sensory extension where 'our extended senses, tools, and technologies' had been 'closed systems incapable of interplay or collective awareness'. However, 'Now, in the electric age, the very instantaneous nature of co-existence among our technological instruments has created a crisis quite new in human history' (1962: 5). McLuhan's sweeping hyperbolic style is much in evidence in that last statement. However, the evolution of networked communication systems and present anticipations of a fully functioning, global neural net is here prefigured in McLuhan's observations of broadcast culture in the 1960s.
- McLuhan's ideas have been seen as the starting point for explanation and understanding of the widely predicted conditions in which cybernetic systems have increasingly determining effects upon our lives. At a point in human history where for significant numbers of people 'couplings' with machines are increasingly frequent and intimate, where our subjectivity is challenged by this new interweaving of technology into our everyday lives, he forces us to reconsider the centrality of human agency in our dealings with machines and to entertain a less one-sided view.

1.6.3 Williams and the social shaping of technology

We noted at the outset of this section that media studies has by and large come to ignore or reject the views of Marshall McLuhan in favour of Raymond Williams's analysis of similar

terrain. In this section we draw out the major differences in their approaches to the question of technology's relation to culture and society.

Human agency versus technological determination

Williams clearly has McLuhan's concept of the 'extensions of man' in mind when he writes that 'A technology, when it has been achieved, can be seen as a general human property, an extension of a general human capacity' (1974: 129; our italics). McLuhan is seldom interested in why a technology is 'achieved', but this is a question that is important for Williams. For him 'all technologies have been developed and improved to help with known human practices or with foreseen and desired practices' (ibid.). So, for Williams, technologies involve precisely what McLuhan dismisses. First, they cannot be separated from questions of 'practice' (which are questions about how they are used and about their content). Second, they arise from human intention and agency. Such intentions arise within social groups to meet some desire or interest that they have, and these interests are historically and culturally specific.

McLuhan holds that new technologies radically change the physical and mental functions of a generalised 'mankind'. Williams argues that new technologies take forward existing practices that particular social groups already see as important or necessary. McLuhan's ideas about why new technologies emerge are psychological and biological. Humans react to stress in their environment by 'numbing' the part of the body under stress. They then produce a medium or a technology (what is now frequently called a prosthesis) which extends and externalises the 'stressed out' sense or bodily function. Williams's argument for the development of new technologies is sociological. It arises from the development and reconfiguration of a culture's existing technological resources in order to pursue socially conceived ends.

McLuhan insists that the importance of a medium is not a particular use but the structural way that it changes the 'pace and scale' of human affairs. For Williams, it is the power that specific social groups have that is important in determining the 'pace and scale' of the intended technological development – indeed, whether or not any particular technology is developed (see Winston 1998). Williams's emphasis called for an examination of (1) the reasons for which technologies are developed, (2) the complex of social, cultural, and economic factors which shape them, and (3) the ways that technologies are mobilised for certain ends (rather than the properties of the achieved technologies themselves). This is the direction which the mainstream of media studies came to take.

The plural possibilities and uses of a technology

Where, for the most part, McLuhan sees only one broad and structuring set of effects as flowing from a technology, Williams recognises plural outcomes or possibilities. Because he focuses on the issue of intention, he recognises that whatever the original intention to develop a technology might be, subsequently other social groups, with different interests or needs, adapt, modify or subvert the uses to which any particular technology is put. Where, for McLuhan, the social adoption of a media technology has determinate outcomes, for Williams this is not guaranteed. It is a matter of competition and struggle between social groups. For Williams, the route between need, invention, development, and final use or 'effect' is not straightforward. He also points out that technologies have uses and effects which were unforeseen by their conceivers and developers. (A point with which McLuhan would agree.) Overall, Williams's critique of McLuhan adds up to the premiss that there is nothing in a particular technology which guarantees or causes its mode of use, and hence its social effects. By viewing media the way he does, he arrives at the opposite conclusion to McLuhan: what a culture is like does not directly follow from the nature of its media.

Concepts of technology

We have noted how broadly, following a basic (nineteenth-century) anthropological concept of 'man' as a tool user, McLuhan defines a technology and how he subsumes media within this definition without further discussion. Williams does not. First, he distinguishes between various stages or elements in a fully achieved technology. The outcome of this process is subject to already existing social forces, needs and power relations.

In line with the 'social shaping of technology' school of thought (Mackenzie and Wajcman 1999), Williams is not content to understand technologies only as artefacts. In fact the term 'technology' makes no reference to artefacts at all, being a compound of the two Greek roots *techne*, meaning art, craft or skill, and *logos*, meaning word or knowledge (Mackenzie and Wajcman 1999: 26). In short, technology in its original form means something like 'knowledge about skilful practices' and makes no reference at all to the products of such knowledge as tools and machines. So, for Williams, the knowledges and acquired skills necessary to use a tool or machine are an integral part of any full concept of what a technology is. McLuhan is largely silent on this, his attention being fully centred upon the ways in which technologies 'cause' different kinds of sensory experience and knowledge ordering procedures.

CASE STUDY 1.8: The social nature of a media technology

Williams takes the technology of writing, which was so important in McLuhan's scheme of things, as an example (Williams 1981: 108). He differentiates between:

- **Technical inventions and techniques** upon which a technology depends, the alphabet, appropriate tools or machines for making marks, and suitable surfaces for accurately retaining marks;
- **The substantive technology** which, in terms of writing, is a distribution technology (it distributes language) and this requires a means or form – scrolls of papyrus, portable manuscripts, mass-produced printed books, letters, or emails and other kinds of electronic text;
- **The technology in social use.** This includes (a) the specialised practice of writing which was initially restricted to 'official' minorities and then opened up, through education, to larger sections of society. But always, each time this happened, it was on the basis of some kind of argued need (the needs of merchants, of industrial workers, etc.), and (b) the social part of the distribution of the technologically reproduced language (reading) which again was only extended in response to perceived social needs (efficient distribution of information, participation in democratic processes, constituting a market of individuals with the ability to consume 'literature', etc.).

As Williams points out, at the time of his writing in 1981, after some thousands of years of writing and 500 years of mass reproduction in print, only 40 per cent of the world's population were able to read and hence had access to written texts. In this way, Williams argues that having noted the strictly technical and formal aspects of a technology we are still crucially short of a full grasp of what is involved. For these basic techniques and forms to be effective as a technology within a society, we also have to add the ability to read and to be constituted as part of a readership or market by publishers. Simply put, writing cannot be understood as a communications technology unless there are readers. The ability to read, and the control of, access to, and arrangements for learning to read, are part of the distributive function of the technology of writing. In this sense, Williams argues, a full description of a technology, both its development and its uses, is always social as well as technical and it is not simply a matter of the 'social' following the technological as a matter of 'effects'. Clearly this is an argument that can be extended to new media as policy debates about the growing existence of a 'digital divide' illustrate. The extent to which the technology can have transformative 'effects' is more or less in relation to other pre-existing patterns of wealth and power.

The concept of a medium

While McLuhan uses the term 'medium' unproblematically and is quite happy to see it as a kind of technology, Williams finds the term problematic and he shares with some other theorists (Maynard 1997) an uneasiness about conflating 'media' and 'technology'. It is often implicit for Williams that a medium is a particular use of a technology; a harnessing of a technology to an intention or purpose to communicate or express.

CASE STUDY 1.9: When is a technology a medium?

Here we might take the much-considered case of photography. Clearly there is a photographic technology; one in which optical and mechanical systems direct light onto chemically treated surfaces which then become marked in relation to the way that configurations of light fall on that surface. This, however, is not a medium. The manufacture of silicon chips, a technical process upon which the manufacture of computers now depends, uses this photographic technology. It is used to etch the circuits on the microscopic chips. This is a technological process – a technology at work. However, another use of the photographic technology is to make pictures – to depict persons or events in the world. This may also be a technology at work. However, when it is said that these pictures or images provide us with information, represent an idea, express a view, or in some way invite us to exercise our imaginations in respect to the contents and forms of the image, then we may say that photography is being used as a medium. Or, more accurately, the technology of photography is being used as a medium of communication, expression, representation or imaginative projection. On this line of argument, a medium is something that we do with a technology. Clearly, what we do needs to be of an order that the technology can facilitate or support but it does not necessarily arise from the technology itself. Having an intention for a technology is not synonymous with the technology per se. A technology becomes a medium through many complex social transformations and transitions; it is, in Williams's reading, profoundly the product of culture and not a given consequence of technology.

Williams is also wary about the theoretical implications that the term 'medium' has come to carry. First, he criticises and virtually dismisses it as always being a misleading reification of a social process. Second, he sees that it is also a term that is used to recognise the part that materials play in a practice or process of production, as in artistic processes where the very nature of paint, ink, or a certain kind of camera will play a part in shaping the nature of an artistic product (1977: 159).

Medium as a reification of a social process

When he thinks about the sense in which a medium is a reification, McLuhan can be seen as very much in the centre of Williams's line of fire. Williams uses the following seventeenth-century statement about the nature of vision to demonstrate what he sees to be the major difficulty, still present in contemporary thought, with the concept of a 'medium': 'to the sight three things are required, the Object, the Organ and the Medium' (1977: 158).

The problem, he argues, is that such a formulation contains an inherent duality. A 'medium' is given the status of an autonomous object (or the process of mediation is given the status of a process that is separate from what it deals with) which stands between and connects two other separate entities: that which is mediated (an object) and that which receives the results of the mediating process (the eye). With language as his example, Williams points out that when this concept of a medium is being used, 'Words are seen as objects, things, which men [sic] take up and arrange into particular forms to express or communicate information which, before this work in the "medium" they already possess' (1977: 159).

Williams argued against this position – for him the process of mediation is itself constitutive of reality; it contributes to the making of our realities. Communication and interaction are

what we do as a species. The 'medium' is not a pre-given set of formal characteristics whose effects can be read off – it is a process that itself constitutes that experience or that reality. So for Williams to argue that 'the medium is the message' is to mistake and to reify an essentially social process taking place between human agents and their interests as if it were a technological object outside of human agency. As a theoretical conception which structures thought it necessarily leaves us with sets of binary terms: the self and the world, subject and object, language and reality, ideology and truth, the conscious and unconscious, the economic base and the cultural superstructure, etc. (see **5.1.8** for some problems with binary terms).

Medium as material

One way of avoiding this problem is to narrow the definition of a medium. This is the other direction which Williams's thought on the subject takes. He recognises that a 'medium' can also be understood as 'the specific material with which a particular kind of artist worked', and 'to understand this "medium" was obviously a condition of professional skill and practice' (Williams 1977: 159). The problem here, writes Williams, is that even this down to earth sense of a medium is often extended until it stands in for the whole of a practice, which he famously defines as 'work on a material for a specific purpose within certain necessary social conditions' (1977: 160). Once again we see that Williams wants to stress that a medium is only part of a wider practice, a material that is worked upon to achieve human purposes pursued in determining social contexts; a means to an end.

1.6.4 The many virtues of Saint McLuhan

Introduction

Following our 'mapping' of McLuhan's ideas in **1.6.2**, we will now move on to a discussion of three core theses that emerge from those ideas. These are:

- 1 the extension thesis: technology is an 'extension of man' (1964);
- 2 the environmental thesis: 'the new media are not bridges between man and nature: they are nature' (1969: 14);
- 3 the anti-content thesis: 'Societies have always been shaped more by the nature of the media by which men communicate than by the content of the communication' (1964: 1).

If Williams, as we noted in **1.6.1**, has become, as it were, the 'deep structure' of cultural and media studies' address to technology, McLuhan's theses spring up, barely disguised, whenever a new medium arises and draws attention to the question of technology. It is important to note, then, that while the debate between Williams and McLuhan centres around the 'old medium' of TV, that debate continues to frame contemporary cultural discussions of technology in general, and of cyberculture in particular.

Since his 1967 review of *Understanding Media*, for instance, McLuhan has been one of the constant references in the work of Jean Baudrillard. One of Baudrillard's most famous theses, concerning 'The Implosion of Meaning in the Media' (in Baudrillard 1997), is precisely concerned to analyse further McLuhan's anti-content thesis. Similarly, Baudrillard's critics (see, for example, Kellner 1989; Gane 1991; Genosko 1998) have consistently drawn attention to his debt to, and criticisms of, McLuhan: if he rejects McLuhan's optimistic neo-tribal future, Baudrillard extends the idea that 'the medium is the message' further than McLuhan

ever did. Moreover, as Istvan Csizsery-Ronay (in McCaffery 1992: 162) has noted, it is precisely his concern with systems over meaning in his analyses of media that makes him a 'philosopher of **cyberpunk** and a practitioner of cybercriticism'.

Again, Arthur Kroker's analysis of technology and postmodernity places McLuhan's extension thesis at the centre of that discussion, quoting from *Counterblast* (1969: 42) McLuhan's assertion that the rise of electronic technologies makes the technological environment one composed from 'the externalisation of the human nervous system' (Kroker 1992: 64). Finally, the extension thesis recurs wherever cyborgs, 'couplings of organisms and machines' (Haraway 1991: 150), are concerned (and, as we shall see below, the longest-lived theory of technology in general is precisely the extension thesis). These examples are far from exhaustive. Indeed, while some theorists make partial use of McLuhan's work, others (De Kerckhove 1997; Genosko 1998; Levinson 1999) maintain simply that McLuhan is the theorist of cyberculture. We are not asking, however, whether Williams or McLuhan provides the more accurate or 'correct' theory. Rather, what we want to show is that this 'old media' debate continues to provide essential co-ordinates on the map of new media and cybercultural studies. As we show in **1.1**, we have been here before: debates about 'new media' have been around for a long time!

We shall examine each of McLuhan's three theses in turn.

The extension thesis

The 'extensions of man', although widely recognised as McLuhan's coinage, expresses the functional differences in human capabilities introduced by the (then) new media. It was not, however, a new idea. In fact, it stretches back to Aristotle in the fifth century BC. By tracing the long history of this thesis, however, we will see that it is clearly based in the nature of the human body. We will look at four versions of this thesis: Aristotle, Marx, Ernst Kapp, and Henri Bergson.

ARISTOTLE

In two works on practical philosophy – the *Eudemian Ethics* and the *Politics* – Aristotle discusses the idea that tools are extensions of soul and body. Thus, in the former work he writes:

For the body is the soul's natural tool, while the slave is as it were a part and detachable tool of the master, the tool being a sort of inanimate slave.

(*Eudemian Ethics*, book VII, 1241b; in Barnes 1994: 1968)

And he repeats the point in the *Politics*:

Now instruments are of various sorts; some are living, others lifeless; in the rudder, the pilot of the ship [the *kybernetes*] has a lifeless, in the look-out man, a living instrument; in arts [*technē*], the servant is a kind of instrument.

(*Politics* book I, 1253b; in Everson 1996: 15)

We can see a certain prefiguration of cybernetics in these passages (see **5.3**), if not of cyborgs: detachable tools, inanimate slaves, living and lifeless instruments. The core of the idea is, however, that instruments extend the functions of the labouring body.

1.6.1 The status of McLuhan and Williams

Donald MacKenzie and Judy Wajcman's influential collection, *The Social Shaping of Technology* ([1985] 1999), for example, while it does not use Williams overtly, mounts a clearly Williamsite challenge to the question of technological determinism

1.1 New media: do we know what they are? 5.3 Biological technologies: the history of automata

MARX

This idea receives a further twist in Marx, where he proposes that technology is a human means of self-extension. Where Aristotle sees instruments as lifeless servants, and servants as living instruments, Marx, in *Grundrisse*, although continuing to root the thesis in the human body, is simultaneously concerned to distance the technological world from the natural realm:

Nature builds no machines, no locomotives, railways, electric telegraphs, self-acting mules, etc. These are the products of human industry; natural material transformed into organs of the human will over nature . . . They are organs of the human brain, created by the human hand.

(Marx [1857] 1993: 706)

While part of nature, the technological extension of human industry creates non-natural organs that in turn extend the human brain's dominion over nature. Political economist that he was, however, Marx would also note the cost of these benefits, insofar as they also transform the relation between the labouring individual and the method of working. When using hand tools, Marx writes, the labouring individual retains an independent capacity to labour; on the other hand, when it is a question of larger machines and systems of machinery (such as are found in factories; *ibid.*: 702), then

The worker's activity . . . is determined and regulated on all sides by the movement of machinery, and not the opposite . . . The science which compels the inanimate limbs of the machinery, by their construction, to act purposively, as an automaton . . . acts upon [the worker] through the machine as an alien power, as the power of the machine itself.

(*ibid.*: 693)

By extending the natural body, then, that body becomes transformed by its own extensions. If the question of who is in control of the machine is unambiguous in Aristotle, it becomes highly complex in Marx, and the socially structuring force forming the labouring body in industrial capitalism.

KAPP

A mere twenty years after Marx's *Grundrisse*, Ernst Kapp wrote *Outlines of a Philosophy of Technology* (1877), in which the phrase 'philosophy of technology' was coined for the first time. In it Kapp wrote, apparently presciently, of a 'universal telegraphics' that would transform (i.e., shrink) time and (manipulate) space. Kapp argues that telegraphics is an extension of the nervous system, just as railways extend the circulatory system. So, like Aristotle and Marx, he viewed technology as a form of 'organ projection'. Thus:

[s]ince the organ whose utility and power is to be increased is the controlling factor, the appropriate form of a tool can be derived only from that organ. A wealth of intellectual creations thus springs from hand, arm and teeth. The bent finger becomes a hook, the hollow of the hand a bowl; in the sword, spear, oar, shovel, rake, plough and spade, one observes the sundry positions of arm, hand, and fingers.

(Kapp 1877: 44–45; cited in Mitcham 1994: 23–24)

As can be seen from this passage, Kapp is more concerned to demonstrate that the forms of tools recapitulate those of human organs. He thus echoes a well-known principle of

nineteenth-century biology, but draws no more lessons from this other than to 'naturalise' the production of technological artefacts.

Bergson was no techno-enthusiast on the contrary, he astutely criticised a technologically dominated way of thinking as mere 'cinematographic thought' ([1911] 1920: 287ff.), and delivered thereby one of the first critical analyses of the technology and effects of cinema

BERGSON

At the turn of the twentieth century we find the same idea in Henri Bergson's *Creative Evolution* ([1911]1920), where the philosopher notes that technology 'reacts on the nature of the being that constructs it', much as Marx indicates, insofar as it 'confers on him . . . a richer organisation, being an artificial organ by which the natural organism is extended' ([1911] 1920: 148). In Bergson ([1911] 1920: 148) as in Marx, the extension is thus extended itself, as this later passage makes clear:

If our organs are natural instruments, our instruments must then be artificial organs. The workman's tool is the continuation of his arm, the tool-equipment of humanity is therefore a continuation of its body. Nature, in endowing each of us with an essentially tool-making intelligence, prepared for us in this way a certain expansion. But machines which run on oil or coal . . . have actually imparted to our organism an extension so vast, have endowed it with a power so mighty, so out of proportion with the size and strength of that organism, that surely none of all this was foreseen in the structural plan of our species.

([1932] 1935: 267–268)

Here extension has run full circle: the extensions, although grounded in the human body, extend themselves in such a way as to alter that body. While nature endowed that body, say Marx and Bergson, with a tool-making capacity with which to extend itself, that capacity has grown in scale so much that it must act on its own plans, having outstripped nature.

The basis of the extension thesis becomes clear: it is rooted in the nature of the human body. In all the accounts of this thesis we have examined, technology is rooted in the natural capacities or forms of that body. In some, particularly Marx and Bergson, it feeds back on that body and alters it, and thereby alters its environment. Thus we arrive at the second of McLuhan's theses: the environmental thesis.

The environmental thesis

[T]he new media are not bridges between man and nature: they are nature.

(McLuhan 1969: 14)

Whereas Marx and Bergson make explicit their claims concerning the difference between hand-tools and large-scale machines or systems of machinery, Aristotle and Kapp do not: all technology simply extends the body. However, the key question that Marx and Bergson pose concerns the scale of technological extension, or what sociologist Jacques Ellul called 'the selfaugmentation of technology' ([1954] 1964: 85ff.). This thesis entails two main things:

- first, that above a certain threshold of quantitative change (the number of technologies a society uses) there arises a qualitative change in the structure and functioning of that society;
- second, that technology, at that point, becomes autonomous, determining its own future and that of the society it shapes.

We can see a very different account of technological determinism arising here than that Williams ascribed to McLuhan. We shall return to this account when we revisit the issue of

determinism in **5.2.4**. We can immediately note, however, that the qualitative change Ellul describes evokes a relationship between what Bergson describes as the scale of a given technology once it has left the category of the hand-tool, and that of technology's environmental impact: we hold a hammer, but we work in a printing press. In this sense alone, technology clearly changes society, not only in the environmental scale of its impact but in the changes to the working relationships between human and machine this entails.

When McLuhan considers the technological environment, however, he means something quite different from the obvious, physical bulk of a factory. This means, in turn, that McLuhan does not make any qualitative distinction between tools and systems of machinery. His sense of the technological environment remains physical, but in a far more subliminal, hard-to-perceive way. When writing about the electronic media, McLuhan coins the phrase 'the hidden environment' (1969: 20–21) to describe the effects of their presence:

Media of all kinds exert no effect on ordinary perception. They merely serve human ends (like chairs!) . . . Media effects are new environments as imperceptible as water to a fish, subliminal for the most part.

(McLuhan 1969: 22)

In other words, McLuhan's idea of media effects is not of the tabloid type: Rambo machine-guns a Vietcong village, therefore an impressionable but disaffected teenager runs amok in suburbia. Rather, they subtly alter everything, so that now all human actions take place in a technologically saturated environment that has become the natural world, never rising above the threshold of perception.

An excellent illustration of what McLuhan is getting at here can be found in Paul Verhoeven's *Robocop* (1984). After Murphy (Peter Weller), a cop in soon-to-be New Detroit, is gunned down, his dying body is taken to hospital where he is 'prepped' for various cybernetic implants: titanium-cased arms and legs, capable of exerting enormous pressures, their muscular power amplified by servo-motors; a microchip memory, and so on. The last implant we witness being fitted is his visual grid, which the viewer sees being bolted down over his face plate. The grid itself becomes increasingly visible as it is screwed into place, but disappears again once fully fitted. Robocop has utterly absorbed this visual filter, no longer seeing it, but actually seeing through it.

Just as Kapp sought to naturalise the forms of tools and technologies, so McLuhan points to the naturalisation of effects: if we want to understand the scale of the impact of technological change on culture, we must dig deeper than the content of the media and look at the technological effects of the media themselves. This, then, brings us to the third of Saint McLuhan's many virtues: the elevation of the media above the message. Before we move on, however, note the difference between the technological environments Marx, Bergson and Ellul describe, and that which McLuhan describes: the first is a process that necessarily gets out of hand, spiralling beyond human control; the second is like the screen fitted to Robocop's ocular implants – you notice it on its way in, but not once it becomes the pre-conscious experiential filter.

THE ANTI-CONTENT THESIS: 'THE MEDIUM IS THE MESSAGE'

The above phrase is the real title of McLuhan's often misquoted but most famous work (1967). The 'massage' brings out the tactile, sensory effects of the media, as discussed above. At the beginning of that book, a very hypertextual collage of image and text, he writes,

Societies have always been shaped more by the nature of the media by which men communicate than by the content of the communication.

(McLuhan and Fiore 1967a: 1)

McLuhan's critical element is often left out. He is not arguing, as do Adorno and Horkheimer (1996), for example, that popular media are formally repetitive and therefore a cultural evil, but that, materially, their effects constitute a violent alteration of the sensory environment humans inhabit

In other words, McLuhan is arguing that it is not the content of the media that matters at all: whatever the narrative, representational strategy or the ideological mystifications taking place in media narratives, they are decidedly unimportant next to the constant sensory assault stemming from radio and television. As he puts it in an interview, the 'massage' of his 1964 work is created by

the shaping, the twisting, the bending of the whole human environment by technology . . . a violent process, like all new technologies, often revolting, as well as revolutionary.

(McLuhan, in Stearn 1968: 331)

In contrast to this 'violent massage', to pay attention to the content of a medium or a text deludes the viewer, reader or listener into a sense of mastery over these machines. McLuhan delivers his scornful verdict on those (academics) who practise this: 'Content analysis divorces them from reality' (in Stearn 1968: 329). In this view, media effects do not so much provoke violence in viewers as exert violence on them. The human sensorium is under assault from the very media into which it extended itself.

If we take all three theses together, the same set of concerns emerges: the body is physically extended by the media; the senses and the environment they sense undergo a 'revolution' (Stearn 1968: 331) with every new piece of media technology. McLuhan's analyses are based on the body, the senses, and the technological environment. What unites all three is what we might call their physicalist emphasis – precisely what humanism in cultural and media studies has been unable to address! We will continue our discussion of the **physicalism** of new media and cybercultural studies in Part 5.

In **5.2.2** we will have one further occasion to return to the McLuhan–Williams problematic, in the context of a thorough examination of what is entailed by the idea of technological determinism. Since any determinism relies on a conception of causality (to say 'X is determined by Y', is to argue that X causes Y), and since there are many accounts of causality, we have yet to establish what notion of causality Williams ascribes to McLuhan and what notion of causality McLuhan is working with.

5.2.2 Causalities

1.6.5 The extent of the 'extensions of man'

At the root of the McLuhan/Williams debate lies the question of whether it is a machine's users that are in control of what they are using, or whether the machine in some sense determines its uses. In the first case, a more or less free human agency governs all historical processes, so that any event that takes place can be traced back to the actions of groups and individuals holding a certain view of things. Thus how we use technology is the only question we need ask of it, creating a gulf between the technology itself and its uses: it is as if technology simply does not exist until it is used. We tend, therefore, not to ask what a technology is, but what purposes it serves. That a technology is used in a particular way (the bomb to kill, television to reproduce the ideological status quo) is an accident of the views held by the controlling group. Therefore the point of studying the uses of a technology is not to study the technology but to analyse and contest the governing ideology that determines its uses. On this view, every technology is a tool.

While such a view works well for individual technologies (especially for isolated communications technologies – consider the displacement of the military ARPANET system into the Internet), it works less well if we consider the extent to which technology becomes environmental. In other words, there are quantitative changes in the scale of the work that can be accomplished in the shift from the tool to the machine, but as a consequence there are also fundamental qualitative shifts that alter the relation of human and machine. Rather than being reducible to tools for human purposes, when technology becomes environmental it can no longer be localised, isolated from the networks it forms the material basis of. This is the point from which McLuhan begins. Moreover, ‘the medium is the message’ indicates the physical basis of the effects of technology: it is less concerned with a specific or isolated medium in the classical media studies sense (television, radio, film, etc.) than with the sense in which technology becomes the medium we inhabit. Thus, ‘the new media are not bridges between man and nature: they are nature’ (McLuhan 1969: 14). Accordingly, we need pay less attention to the content of a medium than its physical effects (hence ‘message’ rather than message). These are effects principally on the body, since, beginning from the same tool-based conception of technology as does Williams, McLuhan famously views technology as ‘extensions’ of human capacities and senses. Technology therefore becomes a physical medium that alters the physical capacities of the human body. What therefore has traditionally within media studies been disparaged as technological determinism turns out merely to be taking the physical constitution and effects of a technologically saturated civilisation or culture seriously.

We have thus returned to the point from which section **1.6.4** began: the view that technology is an ‘extension’ of human capacities, senses, labour, and so on, a view that has such a long history in how human cultures have conceived their technologies. If, however, we seem merely to have come full circle, we need to re-examine what we have found out along the way. Thus we see that this definition of technology poses increasingly complex questions as technology itself becomes more complex. It is worth reiterating the points at which technology has become more complex:

1.6.4 The many virtues of Saint McLuhan

- 1 Materially: the relation between biological and technological things (between humans and machines) gives rise to several questions. Have our interactions with technology become so all-pervasive as to produce hybrids of biological and technological components, thus unsettling the distinction between the natural and the artificial, or do they result in large-scale actor-networks that resist reduction either to biological or technological bases?
- 2 Causally: if biology is becoming increasingly inseparable from technology (as for example in the case of the Human Genome Project), what sort of causality is involved in technology producing effects? If in a determinist sense, then how? Does technology now, or will it, possess or acquire agency? If so, of what kind?
- 3 We have seen that conceiving of technology in this way constitutes a critique of humanism, which imagines the agent as separable, isolable from his/her/its physical, causal environment. If we do not thus imagine the agent, then in what sense is technology reducible to an ‘extension of man’, and at what point does it begin to become ‘self-extending’?
- 4 We therefore see that studying the question of technology in culture entails opening questions regarding what culture is, and whether it is isolable from its physical environment and the forces therein, as Williams insists it is.

For example, cloning, xenotransplantation, increasingly technological reproductive therapies, genetic engineering, artificial organs, genomics in general and the human genome in particular: the biosciences or biotechnologies seem to produce precisely such hybrids, but the possibilities go further. Cyberneticist Kevin Warwick, for example, recently conducted a year-long experiment using subcutaneously implanted microchips in his own body. Do such technologies extend or alter biological bodies?

If we answer (4) in the negative, then we see how the question of technology opens onto the question of the physical basis of culture. It also therefore opens onto scientific and, in the strictest sense, metaphysical issues. One such metaphysical issue, which has enormous consequences in the sciences, is causality. We have seen that some forms of determinism (of the sort that Williams accused McLuhan of holding) presuppose a linear causality (of the sort that McLuhan argues so strenuously against). For Williams, it is essential to pose the problem of technological effects on culture in this manner if what he called ‘cultural science’ is to be separable from physical science. A second such problem concerns realism and **nominalism**. Generally speaking, nominalists argue that general terms such as ‘technology’ constitute nothing more than collective names to designate the totality of actually existing technological artefacts. This view is called nominalism because it believes that general terms such as ‘technology’ are nothing but names for collections of specific individuals. When nominalists talk about technology itself (or when they spot others talking in this way), then they say this amounts to nothing other than talk about empty names. Some nominalists suggest that such terms therefore be eradicated, voided of all but numerical or grammatical sense; others accept this lack of reference to the real world as an inescapable condition of human knowledge, since it is linguistically mediated, and the reference of a term is merely a structural artefact. Realists, by contrast, argue that ‘technology’ as such has characteristics not necessarily instantiated in all or even in some individual and actual artefacts. Many things are technological: not only mechanical, steam, electrical or digital machines, but also social structures or ‘soft technologies’ as Jacques Ellul calls them (Ellul [1954] 1964). Moreover, the realist may include in the concept of technology things that do not have any actual instantiation, but that remain real in some other form or function (a good example here is Babbage’s Difference Engine, which was not fully constructed until 1991: prior to that date, did such technology really exist?). The crucial difference, however, is that realists need not view language either as simply naming things, or as a screen that either frames or obscures the stuff and matter of things and forces: physics.

Both these issues come clearly into focus when we consider history in general, and the history of technology in particular. Before moving on to a discussion of these topics, which pick up from sections **1.4** and **1.5**, we must also note the consequences of another aspect of the extension thesis as regards technology: that is, that as technology becomes simultaneously less massive and more environmental, deterministic consequences become correspondingly more likely. This is something McLuhan missed, but that Lyotard picks clearly up on. This position, known as ‘soft determinism’ (determinist consequences resulting from indeterminate causes; see **5.2.4**), recognises the difference in outcome of introducing a new tool into an agrarian culture, a new power source into an industrial culture, or a new programme into a digital culture. Such considerations give rise to the view that technological determinism is not a historical constant (as hard determinists, if they exist anywhere, would argue), but is historically specific to a degree of technological complexity in a given cultural frame. Moreover, it poses the question of what it is that is thus extended: is it the human sensorium, will, muscles, or bodies, as Aristotle, McLuhan and Marx say, or is it technology itself, as Ellul and Lyotard argue? If the latter, is there any such place as ‘nature’ or ‘culture’ that remains exempt from the actions of technology, or do we require, as Latour demands, a new constitution for the actor-networks, neither reducibly human nor machinic, but instead, bio-socio-technical?

What then are the consequences of taking the physical effects of technology seriously? First, as we shall see in Part 5, it entails that we can no longer separate physical from cultural processes, or matter from meaning. We can thus see how in attempting to answer the

1.4 What kind of history?
1.5 Who was dissatisfied with old media?

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5 Cyberculture: technology, nature and culture

question ‘what is technological determinism?’ we are led to pose questions that carry us necessarily from the sphere of culture to those of technology and, finally, nature.

1.6.6. A new focus for old debates: Science and Technology Studies

[S]cientists shout at sociologists, who shout back. You almost forget that there are issues to discuss.

(Hacking 1999: vii)

One of the crucial issues to arise from the problems discussed in **1.6** concerns the relation between the natural and the human sciences. Broadly speaking, we may characterise the issue thus: if Williams’s account is correct, then the cultural sciences focus on different entities altogether than the natural sciences; if, conversely, McLuhan’s concerns become the model of the cultural analysis of technological entities, then no such division of the ‘natural’ and ‘cultural’ sciences is viable. Since the 1980s, the character of this division of scientific labour has received renewed focus through the field known as Science and Technology Studies (STS). This simple fact attests to the crucial relevance of the McLuhan–Williams debates, which continue, as we shall see, to map the available positions in this newer field.

The problem with a media studies that follows Williams’s model of ‘cultural science’ is that it eliminates any relationship at all between cultural and natural phenomena. Because STS has drawn renewed attention to this problem, it is a corrective to any presumed insulation of cultural from natural phenomena.

This is not to argue, however, that all practitioners of STS occupy the McLuhanite position; quite the contrary. The historian Steven Shapin, for instance, a notable participant in the STS debates, announces ‘I take it for granted that science is a historically situated and social activity’ (Shapin 1996: 7). Although he may take this for granted, Shapin nevertheless deemed a statement of this fact to be necessary. It is *the fact of the statement* that is important to the constitution of STS. Accordingly, it will be helpful to characterise STS as that field for which the relation of the natural and cultural sciences remains a *problem*, and STS itself therefore as a *problem field*. A brief examination of *how* these problems have been discussed will therefore provide a useful outline of STS from its inception to its more recent forms.

STS is generally held to have begun with the journal *Radical Science* (cf. Haraway 1989: 7) and the work of the ‘Edinburgh School’ (see Barnes, Bloor and Henry 1996) in the 1970s, followed by the ‘Bath School’ of what was called the ‘sociology of scientific knowledge’ in the 1980s (see Collins and Pinch 1993).

Although both schools might be broadly characterised as favouring the orientation Williams offers towards a specifically cultural science, arguing (again, generally speaking) for a species of social constructivism (**5.1.9–5.1.10**), the two founding schools of STS dispute the isolation of cultural from natural science, at least by submitting the latter to cultural analysis. Importantly, while thereby relativising the practice of science to historical and social locations, neither school advocates the extension of such a constructivism to the conclusions reached by those sciences. Rather, they seek to demonstrate that while the social domain importantly *includes* the address to physical nature, and while this fact entails the applicability of sociological modes of analysis to scientific practices and institutions, it does *not* entail that natural phenomena are therefore *nothing more than* cultural products.

An instructive example of the approach of these schools is provided by Barnes’ *Interests and the Growth of Knowledge* (1977) and Collins and Pinch’s *Frames of Meaning: the Social Construction of Extraordinary Science* (1982). These works follow the philosopher of science

Imre Lakatos (1970) in proposing that sociological constraints (teaching and research institutions, politics, funding, and so forth) play a decisive role in establishing scientific research programmes. This means that there is no such thing as pure research into nature, since such research is always conducted under the auspices of social pressures. Facing this problem, however, scientists differentiate between what is internal and what external to scientific practice and research, insulating a scientific 'core' from a social 'periphery'. What became known, following David Bloor (1991: 3–23) as the 'Strong Programme in the Sociology of Knowledge' therefore seeks to demonstrate the socially and scientifically complex 'framing' of scientific cores, and to draw out what this means for the constitution of scientific knowledge. However, acknowledging this social dimension to the construction of scientific research programmes is entirely different, as Hacking (1999: 68) notes, to 'doubting the truth . . . of propositions widely received in the natural sciences'. Science studies actual nature, albeit in an irreducibly social context.

Its influence on Cultural Studies in North America is marked (often through the work of Donna Haraway), though its emphasis on the operations and agency of technology and other material phenomena marks its difference from the articulations of technology and the human usually offered by the (social constructionist – see below) humanities and social sciences. Anne Balsamo (1998) and Jennifer Slack and J. Macgregor Wise (2002) offer accounts of the influence of STS on North American Cultural Studies. It has yet to register significantly in British Cultural Studies and has – as yet – had little to say on computers, and next to nothing on popular media or media technologies. It does though offer rich theoretical resources for theorising relationships and agency in popular new media and technoculture.

The approach pioneered by these sociologists of scientific knowledge remains very much alive, as illustrated by the opening of archaeologist and STS contributor Marcia-Anne Dobres' *Technology and Social Agency*: 'This is a book about technology. It is therefore, first and foremost a book about people' (Dobres 2000: 1). Just as Dobres' forerunners did not extend the social construction of scientific research programmes to a socially constructed natural world, Dobres does not think that the priority she considers must be accorded human actions and intentions in the analysis of a technology-rich environment entails that all agents are necessarily human. In 'making and remaking of the material world' is included the manufacture of *agents* (2000: 3). Similarly, although Dobres is clear that her book is primarily concerned with people and their interaction – with, that is, the cultural dimension – this culturalist perspective must be augmented, 'as all archaeologists know', by the *material* dimensions of culture. In consequence, Dobres' book 'places special emphasis on the intertwined sociality *and* materiality of technology' (2000: 7; emphasis added); she proposes, that is, that culture is necessarily informed by its physical (natural and technological) context. Clearly, it is the combination of attention to physical and social reality that distinguishes these approaches.

Many notable recent contributions to STS have followed Bruno Latour (1993) in taking as their focus the problem of how exactly this combination occurs. Although Latour began his contributions to STS with a constructionist focus on the function of inscription in science (cf. Latour and Woolgar 1979), in subsequent work he has pursued what he calls 'a more realistic realism' (1999: 15), developing what has become known as Actor-Network Theory (ANT). ANT is premised on two main points: that social actors are not exclusively human; and that it is not things but *networks* that constitute actors, human and non-human. It is precisely because the human and social sciences take it for granted that social agency is exclusively human that Latour's first thesis strikes many in those fields as 'treacherous', as he puts it (1999: 18). To be a social actor is, for such sciences, to be capable of reason, and

therefore of choice. At root, agency rests on a notion of free will, that is, of a will unconstrained by physical causes external to it. Since technological artefacts are incapable of such a will, they cannot be social agents. Latour's counter to this is that social networks, the environments in which humans act, are already technological, physical, *and* cultural, opening *We Have Never Been Modern* with a list of the items singled out for attention in an edition of a daily newspaper: strikes, the threats of war and famine, transportation systems, the HIV virus, photographs taken from the Hubble Space Telescope, political speeches, sports, arts, and so on. Realistically, reality is made up of *networks* of human and non-human things, rather than being divided into entities that are or are not agents regardless of their contexts. Latour's work therefore moves from the constructionist focus of Williams's cultural science to the socially determining pole occupied by McLuhan.

While ANT proposes that reality is made up of nature and culture, rather than one or the other, it arguably does not answer, as Sardar (2000: 41) has noted, the question of 'the degree to which . . . construction' is constrained by some objective reality 'out there'. In consequence, 'science wars' still rage, polarising the sciences and the humanities so that, as Hacking (1999: vii) sadly notes, 'you almost forget that there are issues to discuss' – almost, but not quite. STS has become a vibrant critical forum for the important exchanges between the natural and the human and social sciences, capable of combining with important phenomena such as stem-cell research or the 'visible human project' (Biagioli 1999 is a superb anthology showing the diversity and energy of contemporary Science Studies) from scientific, historical and cultural perspectives

It is precisely because STS reorients cultural attention towards its forgotten physical dimension that it reveals the contemporary impotence of the debate between McLuhan and Williams. Rather, therefore, than amounting merely to an interesting historical curiosity, these debates are core to the future of cultural and media studies. It is precisely because Williams's account of cultural science crucially informs the settled form of cultural and media studies, that STS highlights the 'blind spots' (5.1.1) and assumptions inherent in such approaches to technology. STS not only provides an important corrective to such approaches, but becomes a vital contributor to the cultural study of physical and technological phenomena.

Among the issues that remain in the light of this brief history of STS, the problem of the precise relation between nature and culture remains to be interrogated. If, according to ANT, social networks are assembled from technological, physical, political, intentional and discursive elements, do these networks themselves owe their existence to nature or to culture? Are some elements more essential than others? Even if we assume that networks have priority over elements (that is, that elements do not exist without the networks that make them), we still do not know whether these networks can be said to exist without culture. Although therefore ANT provides what many agree is a 'realistic' and thought-provoking *description* of reality, the question Latour's 'more realistic realism' has yet satisfactorily to answer, concerns reality itself.

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