THE CYBORG SUBJECT

REALITY CONSCIOUSNESS PARALLAX

GARFIELD BENJAMIN

The Cyborg Subject

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Reality, Consciousness, Parallax

palgrave
macmillan

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ISBN 978-1-137-58448-9 ISBN 978-1-137-58449-6 (eBook)
DOI 10.1057/978-1-137-58449-6

Library of Congress Control Number: 2016944999

Printed on acid-free paper

This Palgrave Macmillan imprint is published by Springer Nature
The registered company is Macmillan Publishers Ltd. London

To: $^{M}1\text{-}_{L}0$

Prologue

The age of humanity is at an end! The cyborg cometh! This does not, however, represent cause for alarm; it is not the apocalypse, the new age will cause no sudden doom in which every last human is scoured from the earth by the rise of maleficent technology. Neither does not it constitute a technological singularity; there are no preparations underway for the ultimate party at the joyous moment of simultaneous transcendence by the entire species. It is not a single event at all. It would not be possible to define the moment at which humanity ceased and cyborgs appeared, for it is a process that has been decades, centuries, even millennia in the making, and it is far from complete. The cyborg is evolving just as humanity evolved. It took thousands of years for humans to evolve the cognitive capacities for language (the first and perhaps greatest 'technology' created by humans) and to develop them culturally into a scheme for externally storing and sharing ideas: from the earliest engravings 70,000 years ago; cave paintings and figurative sculptures 40,000 years ago; through crude symbolic Jianhu or Vinča glyphs from the seventh millennium BC; hieroglyphics and cuneiform as the first full written languages in the fourth millennium BC; towards the alphabets and logographic characters that have evolved to constitute contemporary symbolic regimes. This emergence of what is now known as human consciousness occupies a relatively short period in the biological history of *Homo sapiens*, only emerging as a process one terasecond (one trillion seconds, approximately 31,558 years) ago and starting roughly one terasecond before that, barely a third of the

lifespan of *Homo sapiens* as a genetic species. The construction of (written) language as a mode of consciousness signifies the emergence of 'humanity' as we now know it, enabling the spread and development of technology and culture through the ages.

As the human mode of consciousness, the *externalisation of memory* in language and culture as an expression of the individual subject's relation to its understanding of the world, reached a state of stability and efficiency (not necessarily precluding diversity), the seeds of another mode of consciousness were already being planted: that of the cyborg. As a mode of consciousness, in not just externalised memory, but also the *externalisation of mental processing* to machines (what could be labelled a cognitive prosthetic), the cyborg has become inextricably linked to technology in general and digital computers in particular. Yet the cyborg, like the digital technology that supports and enables its realisation, did not spring up instantaneously. As Charlie Gere explains, digital culture preceded digital technology (Gere 2008, p. 17), the necessary development of ideas forming a system of thought that only subsequently allowed computer systems to emerge. Tracing this even further back than Gere, the history of the digital can be seen before the first computer was turned on, before Turing, Von Neumann and Wiener wrote the conceptual papers that defined the fields of computational thinking and cybernetics, before Babbage and Lovelace designed and programmed the difference and analytical engines, before Wells or Verne speculated on bizarre future societies run by technology, before Boole or Leibniz established the mathematical logic for binary code, and before Al Khwarizmi established the basis for abstraction in algebra and algorithms, back towards the Antikythera mechanism of Ancient Greece and Egyptian hieroglyphic representations of binary numbers. Indeed, the seeds of the digital have been a long time gestating, and only now is their fruit emerging as a genuinely cyborg consciousness, fulfilling the development of a culture that has awaited the technology through which its ontology could be mediated.

But what is the cyborg today? What constitutes the result of this process that has taken thousands of years to develop? To understand the cyborg we must define its difference from humanity, the shift in modes of thinking that have allowed a new consciousness to evolve. This shift is the introduction of a gap between physical and digital worlds. The conventionally human consciousness rests firmly within the physical mode of thinking and of reality, while the cyborg straddles this gap as it engages with both physical and digital realities, both physical and digital modes of consciousness.

The gap between physical and digital worlds is thus formed as an irreducible gap of consciousness. Central to this book will be the formulation of the cyborg as such a gap, spanning the two perspectives of physical and digital reality within one functioning consciousness. This simultaneity of antagonistic perspectives, alternative modes of viewing the world, is what can be labelled an 'ontological parallax'. In order to construct a view of the cyborg that draws out the conflicting perspectives on reality across the irreducible gap between physical and digital worlds, this book will use as its starting point a reinterpretation and reapplication of the notion of parallax as established by Slavoj Žižek. Expanding upon the conceptual framework of Karatani (2003), Žižek (2009a, p. 7) describes parallax as an epistemological shift in the subject (a change in perspective) creating an ontological shift in the world (changing the objects it perceives). In this book the concept is transferred from the disruption of the apparent material world and social reality by active consciousness onto the irreducible difference between physical and digital realities and their relation to the subject. Both realities thus occur as part of a subjective reality, from a position within the gap between worlds, and the cyborg subject emerges as this process of positing physical and digital reality within consciousness. The human subject, by comparison, emerges as a positing only of the physical world, while we can only speculate on a consciousness existing solely in the digital world: perhaps as a mind fully uploaded to a computer, or in the form of a strong artificial intelligence (AI) that might be one day be classed as 'sentient'. To establish a framework for cyborg consciousness therefore necessitates a framework of the process of parallax that shifts the subject between physical and digital worlds; a system of functions that takes into account the position from which the subject thinks itself and its subjective reality.

This 'thinking itself' of the subject is the self-positing of consciousness that sustains physical/digital reality. This is a process, a series of functions that can delineate the relation of consciousness to itself and its physical and digital modes of thinking reality in cybernetic parallax. Four such functions will be developed and applied throughout this book as a means of understanding the internal functioning of consciousness and the changes in its internal perspectives that constitute the psychological difference between physical and digital worlds. These functions are: Existence, Meaning, Real and Virtual. Each of these is present in both physical and digital modes of consciousness, for rather than the presence or absence of concepts such as Virtuality, it is a matter of their relative alignment and

manner of functioning together that constructs the different perspectives and thus realities that we label physical and digital. These functions encapsulate the underlying structures and internal drives of subjective reality, a psychological construction of consciousness in its fundamental desire for continued functioning within physical and/or digital worlds, and thus the perpetual self-positing of the cyborg subject. As the rapidly increasing prevalence of computers and the ubiquity of accessible touch-screen devices spawns a generation raised into digital consciousness alongside physical modes of thinking, a reconsideration of cybernetics in terms of consciousness is necessary in both the fulfilment of the shift from human to cyborg and the changing face of culture that has developed across the gap of physical and digital worlds.

The introductory chapter will therefore establish a perspective on the current field of theories of digital technology and conceptions of the cyborg before outlining a new mode of conceiving cyborg consciousness in terms of ontological parallax between physical and digital driven by the four functions of consciousness. The discussion will focus particularly on the increasingly complex relation between the Virtual and the Real, its fundamental role to the construction of cybernetic subjectivity, and the extrapolation of a cyborg culture under this theoretical framework. An emphasis on the individual cyborg subject will be used to draw out specific expressions of cybernetic thinking through the analysis of cultural artefacts that exemplify the antagonistic relation between functions and worlds, expanding the philosophy of the digital in terms of subjectivity and culture. Five chapters will then follow, each offering a different perspective on the cyborg subject based on a closer examination of a specific relation between the functions of consciousness: the inversion of Existence and Meaning; the simultaneous emergence of Real and Virtual; the Real of the subject's own being in a world; the structure of fantasy supporting the relation between Virtual and Real; and finally the possibility of a resolved and sustained antagonism of Virtual and Real. Each chapter will also focus on a specific aspect of digital culture, a specific medium for subjective engagement with (re)thinking technology.

The following chapter, *The Open Subject*, outlines the fundamental difference of the physical and digital modes of reality within consciousness, formed through the inversion of Existence and Meaning. Focusing on critical interventions through online media, including a case study of the work of Maurice Benayoun, the internality of this gesture is extrapolated as the mediation of consciousness by itself between realities. This sets the

scene for the other chapters by constructing the relation of the subject to the two realms. In the fourth chapter, *The Empty Subject*, the inquiry withdraws from the specifics of physical and digital worlds to interrogate the emergence of the subject. The formation of consciousness as a functioning Virtuality from the inaccessible Real of the human mind informs the inaccessible nature of the void at the heart of the subject, expressed through digital art practices that explore the Reality of code and digital subjectivity. The focal study of this chapter will be postdigital subjectivity in the work of Pascal Dombis. Expanding this negotiation of loss at the core of the cyborg subject, the fifth chapter, *The Absent Subject*, confronts the conflicting relations of the Real between physical and digital worlds. The loss of material certainty brought into the everyday life of the contemporary subject in its permeation by the symbolic spaces of digital technologies is framed as a discussion of the physical Real: the loss of physicality that brings about many of the tensions between physical and digital, expressed in the form of the avatar and the dilemma of cybernetic embodiment with a focal analysis on creative practices in *Second Life*. The structure through which the Virtual desire maintains dominance over the lost Real of the subjective position is confronted in the sixth chapter, *The Undead Subject*. Taking the Real to what Žižek describes as its traumatic, horrifying and monstrous conclusion; its relation to the Virtual functioning of consciousness is interrogated through the medium of computer games and the role of fantasy in the lives and deaths of the cyborg. This will be exemplified in the narrative and ludic structure of the *Portal* games and their cybernetic antagonist. The potential for the cyborg subject to extend beyond the boundaries of physical humanity is explored more fully in the seventh and final chapter, *The Impossible Subject*, which uses cultural representations of the digital, particularly speculative fiction, to assess the potential for reconceiving the relation of Virtual and Real. The novels of Hannu Rajaniemi will provide a study of the tension between the extrapolation of consciousness beyond the limits of humanity and the persistence of human consciousness within the cyborg subject. The progression of the chapters, including the focus on different creative practices utilising digital technologies, develops the argument from the starting rupture of digital technology against the physical world, moving inwards to the detailed construction of the subject and then outwards to the future resolution of the problematic relation of the cyborg subject to itself. A series of concluding remarks will return to consider the nature and role of the cyborg located within both contemporary society and a cybernetic society yet to come.

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Acknowledgements

I would like to acknowledge the support of the Centre for Art, Design, Research and Experimentation, University of Wolverhampton, for funding the doctoral research that became this book. I would like to thank Prof. Dew Harrison and Dr. Denise Doyle for their guidance throughout my PhD, as well as their support and advice on my research, writing and academic activities in general. I would also like to thank Prof. Charlie Gere and Dr. Paul Johnson for examining my thesis, their comments on my research and their suggestions for how to turn an academic submission into an actual book that people may want to read.

I would like to thank all the theorists who have inspired and influenced my research, and all the artists, writers and media practitioners whose creative outputs have been discussed in this book. Thanks go also to the many denizens of the metaverse who have recommended books or art works, posted URLs to interesting or unusual websites and videos, shared their musings on a range of bizarre topics, and generally helped guide me through the vast labyrinth of information that threatens to overwhelm any researcher of digital media.

I would like to thank Billy and Hilary for their support and encouragement during the process of preparing my manuscript. And finally, I would like to offer my eternal thanks across all possible realities to my wife Elizabeth for her patience, love, and cakes that have helped us both through the process of undertaking our doctoral studies and the sometimes daunting task of converting a thesis into a first book.

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CHAPTER 1

The Cyborg Subject: An Introduction

Cyborg Context

Territories of Digital Theory

The current field of research on digital technology tends to focus on the effects of technology in a singular area of society and theory. From the optimistic artists and commentators of the 1990s to the more recent socio-cultural applications of digital theory, there is a disparate canon of the digital that is often entrenched in earlier debates from pre-existing fields. It was earlier techno-enthusiasts such as Heim (1993) and Negroponte (1996) who made the most radical steps towards a philosophy of the digital in-itself, yet they remained speculative, superficial and sanguine in their analyses, focusing on the changes within the technologies themselves as an external material shift, rather than on the socio-cultural evolution occurring within increasingly cybernetic consciousness. More elaborate and influential theories are often based in issues of conventional media, particularly cinema and photography (Sutton et al. 2007), which, limiting the analysis of the digital to its effects on these prior media fields, appears unconcerned with a philosophy of the digital as such. Approaching the digital as a mere extension of pre-existing media creates an instant barrier towards new modes of interactivity. Now an outdated term—having passed through its obverse of interpassivity and into notions of immersive art and alternative, freer modes of engagement—it is the inclusion of

G. Benjamin, *The Cyborg Subject*,
DOI 10.1057/978-1-137-58449-6_1

interactivity in conventional media that motivates many 'new media' theories (Manovich 2001). By contrast, the sustained antagonism between different perspectives has been developed by some within the field of digital art practice as the necessarily 'syncretic' nature of an interdisciplinary cybernetics, whereby the state of 'being both' is emphasised over the binary opposition of physical and digital media (Ascott 2005). This syncretic state can be compared to what is, in this book, developed ontologically in the parallax relation of consciousness between physical and digital realities that forms cybernetic subjectivity.

The inherent role of consciousness in engagement with technology thus remains to be fully theorised. Much work on the digital discusses the importance of our relation to the technology only implicitly (Creeber and Martin 2009, p. 4), rather than drawing it into full view as the focus of the debate. Even the term 'new media' detracts from the differences between physical and digital modes of consciousness on the grounds that the effects of digital culture often predate digital technology (Siapera 2012, pp. 3–6). While emphasising the blurred lines of our relation to the digital, such a stance fails to engage fully with the effect of the digital on consciousness. The relation of the digital to consciousness necessarily predates the proliferation or even existence of digital technology, as the shift has not been a single instantaneous event in which society transitioned from physical in one moment to digital in the next, but a process within consciousness that has allowed the digital as such to manifest. The term 'new media' has been perhaps most prominently emphasised by Manovich (2001), whose background in film governs the framework of his discussion and definition of the term. A direct concern with the digital as a new space for consciousness is thus replaced by the more clear and limited effects of digital technology on established film media theory, transposing existing languages onto digital media even amidst the claim for the necessity of a new language. Highlighting the ideological connotations of the term regarding notions of progress (Lister et al. 2003, p. 11) suggests a view of 'new media' under which the technology is causal with secondary cultural relations, rather than exploring the causality of culture as an effect of consciousness in the intertwined relations of the digital with contemporary subjectivity that have allowed the technology to emerge. Even those who acknowledge the importance of the digital in contemporary discourses (Thurlow and Mroczek 2011) tend towards the presentation of a single theoretical application (for example, Thurlow and Mroczek's sociolinguistics of media) rather than a confrontation with the digital in itself or in

direct relation to consciousness. The aim of this book will therefore be an interdisciplinary approach in the scope of both its theoretical context and application, employing conceptual frameworks as tools to develop a new mode of viewing and critiquing the cyborg subject and its place in contemporary, technologically-mediated reality.

The problematic relation of consciousness to the world is not only of relevance in digital technology. Aside from the long history of the philosophy of mind that has dominated Western thought since Descartes, at the beginning of the twentieth century science had already unearthed the seeds of tension between the appearance of the material world and the role of consciousness in the causal processes that underpin it. Quantum physics, with its focus on wave/particle duality, disrupts classical notions of our relation to the physical world, moving beyond the subject-object separation towards the causal function of consciousness in collapsing the wave function and creating the appearance of matter. This notion remains pertinent and divisive within science. While digital and cultural theory often use quantum physical concepts as illustrative of hidden processes—such as in the case of Sholette (2011), who provides only a brief, vague and highly allegorical framing in terms of contemporary physics before returning firmly to his established field of the politics of art—there is a gap within theories of the digital across which the active role of consciousness seldom penetrates. This resistance to the fluidity of a causal consciousness in the construction of worlds is seen in the increasing emphasis on a materialism of the digital, entrenching the formerly immaterial realm into notions of embodiment and inert mass.

The Cyborg Reconsidered

Here is where the context of the term 'cyborg' must be confronted, in opposition to the prevailing image of prosthesis and its extension by Haraway (1985). While her work made an important shift away from the solidity of essentialist identities towards a fluid and engaged cyborg, the framing of her discussion under explicitly socialist-feminist terms (see its inclusion in Haraway 1991) places a boundary of pre-existing social power relations upon cyborg consciousness. This enforces the materialist conception of embodiment that impedes a full assessment of the subject as the relations of consciousness to physical and digital worlds, by relating cyborgs only as a resistant political Other against dominant ideologies rather than as Other to itself in the void of subjectivity. Don Ihde also

acknowledges the need for reciprocity between rapidly changing technology and a corresponding philosophy for understanding and reflection (Ihde 2012, p. 331), but undertakes this project in a somewhat narrow conception of cybernetics as prosthesis, ignoring the need for a reciprocal change in philosophy between technology and consciousness across physical and digital realities. He thus emphasises the digital as a technological mediation of closeness, following a phenomenological approach that echoes what he hails in Haraway's emphasis on biology. Outside of the lost fetish of physicality in prosthetic conceptions of the cyborg, cyberspace in itself emerges as a creative alternative space with which consciousness can engage, not merely a tool for communicating across vast distances or simulating a lost physical reality. This difficulty in relinquishing conventional notions of embodiment even in their explicit critique can also be seen in the digital arts; for example, the contributions in Mary Anne Moser's collection (1996) that enforce the role of the physical body as a limiting factor on the experience of consciousness, or the work of Kozel (2007), whose practice as a performance artist focuses her entire theoretical framework around her own body and its relation to external worlds. While these works and others take important steps towards problematising embodiment, the focus on the materiality of the digital further obscures its relation to consciousness.

Katherine Hayles aligns the cyborg with a posthuman stage of evolution, stating that 'the defining characteristics involve the construction of subjectivity, not the presence of nonbiological components' (Hayles 1999, p. 4). While this establishes the subject as the centre of discussion, it risks reducing cybernetics to the prosthetics of physical loss rather than an extension of consciousness itself, and becomes mired in an obsession with reinserting embodiment against the posthuman view of embodiment as the primary physical prosthesis of human consciousness. While Hayles (2005) later recognised the need for an array of potential posthumans, she shifted the discussion once more into a form of embodiment through a materiality of information in digital technologies, rather than into the consciousness of parallax that defines our manner of overcoming the relation between the physical-digital antagonism within the subject itself. This emphasis on materiality arises in part from a misconception of Virtuality, which she defines as 'the cultural perception that material objects are interpenetrated by information' (Hayles 1999, p. 13). In this book the Virtual is rather the process by which consciousness creates the subject, with the simultaneous appearance of materiality and its structures of signification.

It was not until recently that Hayles emphasised the need to acknowledge the shift in perspective of subjects thinking with digital technology, arriving at the position where 'materiality, like the object itself, is not a pregiven entity but rather a dynamic process that changes as the focus of attention shifts' (Hayles 2012, p. 14). What appears to hint towards ontological parallax remains within the specific context of comparative media studies and the impact of technology on scholarly activity. However, the limitations of embodiment linger with discussions of embodied artefacts and informational node bodies (Hayles 2010, p. 328; 2012, p. 15). In a parallax model of the split between human and cyborg modes of thought, it is the spaces between that are of importance, and their shifting positions that come to define the 'nodes' of physical and digital worlds that the subject's consciousness might inhabit.

Mark Hansen appears to make some progress in establishing the emerging need to discuss not separate physical and digital spaces, but rather fluid and mixed spaces and realities, yet remains limited by the centrality of the body as the originary interface of human consciousness in negotiating Virtuality (Hansen 2006, p. 2). This is based on the same error as that of Hayles and Ihde in defining the Virtual as a filling of (physical) space with information rather than as the functioning process of consciousness (or/as computation) between spaces. Hansen does, however, emphasise the importance of functions in a mixed reality, yet returns again to the familiar paradigm of embodied ontology in a return to pretechnological (prereproduction) conceptions of the auric indelibility of the body as an experiential actualisation of data (Hansen 2004, p. 3). While Hansen views embodiment as inseparable from cognitive neural processes, this too reduces the entire consciousness of the subject to a materiality of the physical body. We must move towards a functional approach to consciousness *in itself* if these theories of re-embodiment are to be redisembodied. Only by stepping outside of any situated bodily space can the parallax perspective of the void of subjectivity emerge for critical confrontation.

Anna Munster also makes a purposeful effort to reinsert the body and affect into the digital, placing the Virtual as a part of materiality rather than a force in relation to consciousness. Her focus on the intersections of digital flows and physical bodies (Munster 2006, p. 24) remains entrenched within materiality. There is a clear Deleuzian influence in Munster's work, and both Deleuze and Félix Guattari are referenced heavily in relation to the Virtual, as well as notions of flow, diagram and time. Indeed it is the work of Deleuze that is placed in this book alongside the philosophy

of quantum physics within the framework of Žižek's parallax to interrogate the cyborg subject in relation to the gap between physical and digital worlds under the terms of a series of functions of consciousness. This is in part an attempt to confront a common thread throughout the history of digital theory: a failure to fully address the role of the subject amidst the increasing digitisation of the world. However, such works remain instructive for introducing the relevant questions and problems within scholarly discussion of the digital. For example, Sherry Turkle highlights the contemporary rift between theory and lived experience, between the self as both illusion and fundamental reality (Turkle 1997, p. 15), drawing notions of digital consciousness into the dilemma of modern physics. Similarly, Baudrillard challenges the primacy of the very idea of objective reality, on the grounds that it hold such a firm place in theory simply due to being the simplest solution and the most easily reconciled with common sense experience (Baudrillard 2005, p. 47). The position presented in this book aligns itself with these negotiations of digital technology that have established antagonisms within the relations of embodiment and objective reality and against the materialist insistence on the physical that dominates current scholarship, using cultural theory to analyse the expressions and impact of the digital and consciousness studies to confront the relation of the digital to the contemporary subject. In a reflexive turn, looking further back in order to look further forward, this will necessitate the reappearance of earlier conceptions of cybernetics as an interdisciplinary pursuit for the expansion of human intellect (Ashby 1957; Licklider 1960; Engelbart 1962), a study of our cognitive behaviour and its relation to conceptual and technological processes. To reconsider the cyborg subject thus necessitates a discussion of the internal psychological and metaphysical processes that construct and mediate the parallax gap between physical and digital realms.

Nusselder (2012) has reinserted the need to view cybernetics in terms of cognitive processes, acknowledging the important role of consciousness as its own self-mediating interface, the psychological effects of an approach that foregrounds the internal mechanisms of the individual subject, and a scepticism regarding realism in the wake of digital technologies. Building on Lacan's own discussion of the links between cybernetics and psychoanalytical models (Lacan 1988, pp. 295f), Nusselder offers a thorough rendition of one possible application (or perhaps translation) of Lacanian psychoanalysis directly onto digital technologies under the label of an explicitly cybernetic conception of the subject. However, his text remains

limited by its lack clarity in its framework of terms, instead operating a literal application of Lacanian theory with a focus on the physical interface of the screen, which leads to an overemphasis on the materiality of the digital that somewhat undermines the instructive quality of digital technologies in demonstrating the fundamental *immateriality* of even the physical subject. While the screen has dominated the history of computer culture and perpetually mediated the access to cyberspace by human consciousness, the current and emerging trends suggest that to hold it as the prime manifestation of digital technology is not forward-compatible. Nusselder sets forth his discussion of technology as a remediation of already mediated consciousness (Nusselder 2012, p. 8), but, alongside a consistent conflation of terms such as the 'screen' or the 'virtual', does not progress beyond a view of cyberspace as a 'framing of our reality' (Nusselder 2012, p. 141). Despite emphasising cyberspace as a mental space, this places the digital as a symptomatic (yet also illuminating) structure imposed upon the physical world, rather than an equal and alternative mode of thinking and being within the 'reality' of the cybernetic subject. We should instead view the cyborg itself as a 'virtual' construction of self-mediating consciousness that constructs and reconstructs itself as the causal interface across the parallax gap between physical and digital worlds.

Virtuality and Reality

Within theories of digital technology and its culture, two strands of a radical reassessment of the very terms of the discussion have emerged, centred around the problematic notion of 'Virtual Reality' that has dominated cultural depictions of the digital world. Digital technology has called into question the appearance of 'reality', forcing even the most rigid materialism to have to take into account the possibility of other spaces with which the human subject can engage. How the individual relates to such other potential realities can be understood in redefining the term 'Real' along Lacanian lines, particularly as applied to cultural phenomena by Žižek. Writers such as Gunkel (2010) have furthered this notion, drawing out the Real across physical and digital worlds as the hidden causality (for example, quantum wave functions, DNA or bits of computer code) that underpins the appearance of objective reality. This Real is inaccessible and terrifying, embedded within the psychoanalytical construct of contemporary subjectivity. Counter to this development is the expansion of the term Virtual, often taking into account the definition developed by Deleuze as a surface

that is not actual, but with which the subject can engage. This has been applied as an alternative to the conflation of 'virtual' as 'digital' implied in the labels 'virtual reality' or 'virtual worlds', to instead connect the fluidity of digital surfaces to consciousness in a relation consistent with other generative effects within the structures that form the idealist element in Deleuzian philosophy. Between these two expanded terms, however, and despite established critiques of the overarching framework of 'virtual reality' (Murphie 2002), there is little crossover in current literature. Gane and Beer (2008), for example, draw heavily on the work of Deleuze for notions of virtuality and the concept, while mentioning Lacan only briefly as an extension to Freudian memory. Nusselder (2012) represents a somewhat unusual case in this regard by enacting a specifically Lacanian interpretation of cyberspace that is more concerned with the Deleuzian Virtual than it is the Lacanian Real. Indeed the issue of Lacan's ambiguous, paradoxical (and thereby instructive) Real is not directly confronted in his text, which results in a conflation of real and Real in underpinning the causal forces at work in the antagonisms between physical and digital or material and psychological 'realities'. Throughout the field, the antagonism between Virtuality and Reality thus persists as a theoretical pariah in the parallax of physical and digital. Žižek's own discussion defines Deleuze's Virtual as Lacan's Real, which, while acknowledging the importance of the 'reality of the virtual' over 'virtual reality' (Žižek 2012, p. 3), conflates the nuances of the two processes within consciousness, particularly when applied to their functions in the generation of digital consciousness and the cyborg subject. The antagonistic relation between the Real and the Virtual, in the expanded sense of both terms, forms an integral method of analysis throughout this book, and reconciling Žižekian and Deleuzian philosophies assists in developing a theory of the digital founded upon the antagonistic relation between the Virtuality and Reality of the cyborg subject.

Further consideration of the use of these two thinkers, alongside the philosophy of quantum physics, is required regarding their affiliation with the digital as a series of technologies and as a mode of thinking. Quantum physics, as a hard and abstract science, has at first glance little concern with digital culture. While the search for empirical proof of the particularities of fundamental particles may seem far removed from any cultural implications, the relation of immaterial processes to consciousness provides an illuminating cross-analysis between quantum and digital modes of thinking. Furthermore, the scope for an application of quantum physics

to a philosophy of the digital reinforces the active role of consciousness in constructing a physical or digital reality. This active engagement of consciousness in the ontological impact of subjective epistemological mediation can be seen in several contrasting and even conflicting examples: Hugh Everett's many worlds theory (Everett 1973), which confronts the superposition of actually occurring parallel universes defined only by which probability a consciousness perceives; David Bohm's discussion of thought (Bohm 1994), manifesting as an emergent system across quantum and cognitive disciplines; Max Tegmark's expansion of quantum principles, in particular Everett's 'many worlds' theory, to their cosmological implications (2014); and John Wheeler's it-from-bit theory (Wheeler 1990), in which fundamental physical processes precisely are binary digital operations decided by consciousness. This aligns not only with the binary construction of the digital realm, but also with the developments of the new wave of cybernetics throughout the 1970s and 1980s. During this time the spread of cybernetic thinking to biology and economics emphasised the observer-dependence of systems involving a conscious observer that must be included as a participant in such a system, echoing the necessity in quantum physics of taking the observer into account. Second-order cybernetics, in which the feedback loop of a self-modifying system is itself subject to a self-referential feedback loop, furthers this connection between the knowledge of the observer and the world it observes as a reciprocal participant, the ontological implications of the epistemological position of parallax applied to the cybernetic subject. Thus, while quantum physics appears as a separate discipline, it holds much in common with cybernetics at the level of the seemingly paradoxical loops through which the subjective observer is causally responsible for, yet subject to, the world(s) with which it engages.

Similarly, Deleuze does not directly discuss digital technology in itself, in part due to his texts being written before the widespread availability of computers, the mass application of the internet and the inclusion of the digital in broader culture. However, his work with Guattari establishes methods of analysis that prove instructive when applied to digital culture, and his notion of the Virtual has, as already discussed, formed an integral mode of reconceiving the immaterial flows of digital space. Žižek, on the other hand, often mentions digital culture in his cultural psychoanalysis, offering instructive analyses of digital technologies and critical frameworks for its discussion, most notably in his insistence that 'how cyberspace will affect us is not directly inscribed into its technologi-