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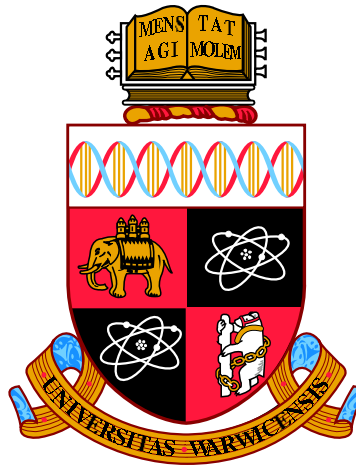
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**Posthuman Leadership
and the
Roles of Computational Objects**

by

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Dissertation

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Declarations

This thesis is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy. It has been composed by myself and has not been submitted in any previous application for any degree.

Abstract

Leadership is a central topic in business and one in which organisations invest heavily. Despite the tremendous influx of computational objects into the workplace and their use as part of the operational framework through which organisational life is enacted, little empirical research exists that explores the relationship between leadership practice and said objects. This study helps to close this critical gap in both practical and theoretical knowledge. Through an interrogation of leadership practice and their enactments with computational objects across a range of situational and comparative empirics, this research develops three original theoretical contributions. First, it presents and develops a range of roles through which computational objects are enmeshed within leadership practice. Second, the study proposes a novel posthuman perspective that attempts to address a historic privileging of the human, positing a disjunction of responsibility from authority. And third, it theorises leadership as a processual phenomenon produced through citationality in material-discursive practice. Through an ethnographic work practice study, this research contributes an original articulation of a posthuman, practice-based theory of leadership not fully accounted for by received conceptions.

Chapter 1

Introduction

Computation is embedded into the technology and practice of everyday life; we continually use computational devices without thinking of them as computational in any way (Dourish and Bell 2011, p. 41).

My preface by way of an extended epigraph marks the frame of this book and introduces its themes: the irreducibility of lived practice, embodied and enacted; the value of empirical investigation over categorical debate; the displacement of reason from a position of supremacy to one among many ways of knowing in acting; the heterogeneous sociomateriality and real-time contingency of performance; and the new agencies and accountabilities effected through reconfigured relations of human and machine (Suchman 2007, p. xii).

This dissertation concerns itself with understanding the role of computational technology in organisational practice. Its specific aim is to understand the relationship between computational objects in enactments of leadership practice. Suchman's epigraph above aptly bounds the concerns with which the research is focused as well as offering a sense of the theoretical and methodological vectors employed to mobilise it. In this chapter, I describe the contexts within which the questions I am addressing are relevant (section 1.1), offer a rationale for the research (section 1.2), explain the research questions (section 1.3), describe the content and format of the research study (section 1.4), and outline the chapters in this dissertation (section 1.5).

1.1 Context

The topic of leadership is highly prized in both business schools and organisations, with a great deal of economic and material resource allocated toward leadership development

and training (Alavi 2008; Day and Antonakis 2013, p. 226). Yet, leadership scholars write of ‘crisis’, using the term *a*) to associate current volatility in the global economic system with a need to develop a different way of thinking about leadership (Heifetz et al. 2009b); *b*) as a reason to reassess the project of leadership entirely (Alvesson and Sveningsson 2003a; Khurana et al. 2004; Miner 1975); and *c*) to call for revitalised scholarship in order to meet the challenges that ‘crisis’ has borne (Nohria and Khurana 2010, p. 3).

Whether or not, as Heifetz et al. claim, conditions will remain ‘uncertain, urgent, and risky’ (2009a, p. 28), scholars from a variety of disciplines agree that the momentum of the Industrial Revolution has given rise to globalism and argued that new forms of organisation, and thus ways of organising, are upon us (cf. Borgmann 1987; Grint and Woolgar 1997; Hayles 1999; Heidegger 1977; Giddens 1991; Kallinikos 2011; McLuhan 1962). Without doubt, leadership practices are subsumed within this process.

Despite this, within the study of leadership, a central but perennially overlooked theme in these transformations is technology (Bass and Stogdill 1990b, p. xiii; Kahai 2012; Lowe and Gardner 2001, pp. 501-502) which has lead, according to Ihde, to a way of life that is ‘technologically textured’ (1990, p. 1). Thus, the Industrial Age has given way to the Information Age, manifested in part due to the existence of modern computational technology that has, since the mid-1950s, become increasingly miniaturised, portable, and networked, yielding what I refer to as the *computational object*. I explain this titular term in greater depth in section 1.2.1.

1.2 Rationale

This study addresses a lacuna at the intersection of three academic disciplines: human-computer interaction (HCI), information systems (IS), and leadership studies, evidenced in part by the particular challenges faced by organisational leadership and their complex, critical, and status quo responses to these (Grint 2010c, p. 307). More specifically, within the leadership literature, the relationship between computational objects and leadership practices remains a largely unexplored territory (Avolio, Walumbwa et al. 2009, pp. 440-441). I elaborate on this gap in section 1.2.2. By adopting well-established HCI and IS perspectives that assert a co-constitutive relationship between technology and practice (Orlikowski 2000; Suchman 1987), I develop a rich understanding of everyday leadership practices and the roles computational objects play in their enactments. Further, through an interrogation of the material-discursive practice (Barad 2007, p. 178) between leadership practices and computational objects in present-day organisations, I aim to develop new understandings, including those that allow for the development of an integrative theory of leadership that includes the roles of computational objects.

1.2.1 The Computational Object

In this research, I employ the specialised term *computational object* to foreground the material interfaces through which humans interact with broader computational systems and their manifestations. I argue that computational objects are phenomenologically distinctive; through them humans experience—and extend—distributed computational platforms via material-discursive practice. As a site of practice, they may be found in the form of a personal computer, smart phone, tablet, or embedded within other objects.

These computational objects are distinctive from other forms of technology, such as airplanes or toasters, yet share a material and embodied aspect through which humans interact with them (Dourish 2001). They signal Turkle’s ‘evocative object’ as ‘a companion in life experience’ (2007, p. 5), acting as a critical site for human relationship (1984 / Turkle 2005, p. 1). Nicolini et al. observe a similar quality in objects that ‘acquire a deep emotional holding power [...] intimate attachment that creates social bonds [...] and sense of belonging’ (2011, p. 614). The term is also derived from Hayles’s ‘computational universe’, which functions as a link to materiality in its ‘claim for computation as ontology [...] the means by which material reality is continually produced and reproduced on atomic, molecular, and macro levels’ (2005, p. 3). The existence of such objects and the material-discursive practices humans undertake—with and through them—signals a critical transformation beyond the liberal human subject that has held sway since the Enlightenment: what Hayles calls *posthumanism* (1999, pp. 283-291). This posthuman perspective attempts to address the historic privileging of the human perspective by including perspectives which go beyond the human.¹ In sum, the term *computational object* is a trope that simultaneously signals my emphasis on materiality, relationality, and a posthuman perspective that moves away from human exceptionalism.

1.2.2 Why are Computational Objects Important to Leadership?

There exists a significant body of work practice studies that demonstrate how technologies affect work practices and vice-versa (cf. Bailey and Leonardi 2015; Barley 1986; Clark et al. 1990; Leonardi 2011; Markus 1994; Miller and Slater 2000; Mumford and Banks 1967; Nicolini 2011; Orlikowski and Yates 1994; Zuboff 1988). All of these studies assert a co-constitutive relationship between work practice and technologies. Computational objects in this context are seen as essential for communication, collaboration, and the production of knowledge work products, such as strategic plans in modern organisations. They are ubiquitous and said to be involved in an ever-increasing range of work practices (Barley 1988, p. 33; Zuboff 1988, pp. 124-126). Yet, if technologies are known to have such a signi-

¹See section 2.3.5 for an elaboration of a posthuman perspective.

ficant impact on work practices, it is surely an omission that studies of leadership have not meaningfully explored their presence in the enactment of leadership. Indeed on review, it is as if computational objects have been ignored; if and when they are included, leadership studies mostly delimit their exploration to ‘virtual teams’ (cf. Alavi and Yoo 1997; Avolio and Kahai 2003; Avolio, Kahai et al. 2000; Bell and Kozlowski 2002; Oakley 1999). This stands in stark contrast to the empirics presented in this study, where those in leadership positions often move fluidly through virtual and non-virtual contexts, often intermixing the two as a hybridised space, and definitely relying upon computational objects in the process. It is on this basis that I argue for the importance of a modern conception of leadership that includes the role of the computational object.

Further, this gap I have identified exists at two levels. The first level is that theories of leadership tend to limit themselves to human actants, rendering non-humans invisible. One need only to consider the extensive use of computational objects in globalised business organisations and the ways in which these are interwoven in everyday experience to recognise this. From this perspective, I suggest that continuing to ignore computational objects in the study of leadership and in the production of its theories is a grave error, in that it fails to account for the production of leadership in ways that matter; that is, producing material outcomes that change the world. The second gap is the dearth of research on leadership that takes the *practice* of leadership as its unit of analysis. On this point, I claim that a practice theory (PT)-based approach (Nicolini 2012; Reckwitz 2002; Schatzki 2002; Shove et al. 2012a) can inform the development of current leadership theory and enable richer understandings. My research programme addresses these two gaps, thereby contributing to the field both by extending theory of leadership to computational objects and by grounding its study firmly in practice.

1.2.3 Why Look at Practices?

A number of leadership scholars have argued that future research should be undertaken exploring the role of technology and leadership using a qualitative approach (Avolio, Kahai et al. 2000; Avolio, Walumbwa et al. 2009; Gronn 2002; Yukl 2009). However, I maintain that the general category of ‘qualitative’ is not specific enough. Here, Van Maanen observes, ethnographic ‘fieldwork is one answer—some say the best—to the question of how the understanding of others, close or distant, is achieved’ (1988, p. 2).

More recently, a number of scholars have mobilised this methodological approach under the moniker *leadership-as-practice* (LAP) (cf. Carroll et al. 2008; Crevani et al. 2010; Denis, Langley and Rouleau 2010; Endrissat and Arx 2013). This work takes the *strategy-as-practice* (SAP) stream (cf. Chia and MacKay 2007; Jarzabkowski 2005; Jarzabkowski and Spee 2009; Seidl and Whittington 2014; Tsoukas 2010; Vaara and Whittington 2012) and

its reliance on practice theory (PT) (cf. Nicolini 2012; Orlikowski 2010; Reckwitz 2002; Schatzki 2002; Shove et al. 2012b) as its theoretical guide.

According to Alvesson, some practices, and the relations these are seen to form, are characterised by group members as leadership (2013, p. 184). But on inspection, the detail of such practices appear to lose the luster and sheen of 'leadership' (Alvesson and Spicer 2011b, p. 196). In this sense, leadership is an amorphous and ideological concept (Miner 1975, p. 202) that becomes difficult to tether when isolated to individual practices. However, when such practices are performed in series, as with the animation of a film, there is no doubt that members recognise such practices as associated with leadership. It is here that I employ Barad's theoretical term *material-discursive practice* (2007, p. 178) interchangeably with the term 'practice' throughout this work as a means to call particular attention to the often invisible dimensions of matter and meaning present in the enactment of practice.²

What then, is the benefit of looking at material-discursive practices so closely in a study exploring leadership, when focusing on practice makes leadership less visible? I believe one answer lies in the choices that members make about their practices. Interrogation of practice makes visible aspects of experience that are obscured by lack of attention to them (Szymanski and Whalen 2011b). It offers informants and readers the opportunity to reflect on their own practices (Alvesson and Spicer 2012, p. 385) and the extent to which these embody the style(s) of leadership they wish to personify.³

A goal then of the research is not to capture 'leadership' so that it can be laid out starkly for all to see; rather, starting from a different set of ontological assumptions, its aims are to critically interrogate *how* leadership is constituted through practices (Alvesson and Spicer 2012, p. 11), to render assemblages of practices in a way that offer an illuminating perspective on what is actually happening (Akrich and Latour 1992, p. 259), and in so doing, to stimulate and engage the thoughts of informants and readers alike (Collinson and Grint 2005, p. 5). In sum, I hope to contribute to the articulation of a posthuman, practice-based theory of leadership not fully accounted for by received conceptions of leadership.

Thus, in taking material-discursive practice as a primary unit of analysis, this dissertation adopts an approach to the study of processual relations between computational objects and leadership practices that, according to Barley and Kunda, holds the promise of enabling possibilities for 'breaking new conceptual ground, resolving existing theoretical puzzles, envisioning organizing processes, and revitalizing old concepts' (2001, p. 76). I offer this investigation at a time when enhancing the capacities of leadership is seen as

²For an elaboration of material-discursive practice, see section 2.3.7.2 on page 66.

³As it pertains to computational objects, a similar principle is at work; computational objects also tend to become invisible as they are enrolled in practice (Latour 1988, pp. 59-110; Suchman 1995).

pivotal to satisfying increasing ‘demands for leadership insights’ and restoring trust in institutions (Nohria and Khurana 2010, p. 5).

1.3 Research Questions

The research questions this study explores were *diffracted* (Barad 2007; Nicolini and Roe 2014, pp. 86-94) through two different lines of extant thought relating to human involvement with computational objects.⁴ By *diffracting*, I mean the development of an understanding of how different theoretical perspectives, when viewed through one another, produce novel perspectives that may be useful. According to Barad, the aim of such an approach is to:

[R]ead insights from these different areas of study through one another [... while remaining] rigorously attentive to important details of specialized arguments within a given field, in an effort to foster constructive engagements across (and a reworking of) disciplinary boundaries (2007, p. 25).

I begin this process by suggesting that one of the extant lines of thought regarding human involvement with computational objects emphasises the role of technology while the other examines the changing identity of the human subject in relation to an increasingly technological environs. The first of these theoretical perspectives emphasises technology as a regulatory mechanism (Brate 2002, p. 14; Kallinikos 2011, pp. 12-33; 1948 / Wiener 1961, pp. 6-7). Here *regulatory* is not limited to commonly (or negatively) conceived views of control, but also functions akin to a bodily organ contributing to the maintenance of conditions within its environment. From this perspective, Kallinikos observes that:

[T]echnological design may not unambiguously determine use, but it is not devoid of implications either. Indeed it would be reasonable to assume that design and use, possibility and actuality are interrelated in many and complex ways that have to be disentangled conceptually and studied empirically over time (2011, p. 16).

One way to interpret what Kallinikos suggests is to frame it in terms of the academic discourse regarding structure and agency (cf. Archer 2000; Berger and Luckmann 1966; Bourdieu 1977; 1969 / Elias 2000; Giddens 1984; Haraway 1988; Ryan 2004; Sewell

⁴I elaborate on the use of a diffractive methodological approach within this research in section 3.1.2 on page 82.

1992), where the question of ‘how the action of individual agents is related to the structural features of society’ (Elliott 2001, p. 294) is central. In order to address the questions of regulatory role in which technology is presumed to be implicated, Kallinikos advocates a research approach exploring the distinctions between what people may *idealise* and what they actually *do* in practice, both in terms of their direct use of technology and in terms of outcomes resulting from technological engagement.

The second line of thought challenges the received view of the human subject and falls under the category of *posthumanism* (cf. Braidotti 2013; Halberstam and Livingston 1995; Hayles 1999; Wolfe 2010), as outlined in section 1.2.1. Under this view, Hayles argues that the adoption of computational objects in everyday life:

[I]s so broad in its effects and so deep in its consequences that it is transforming the liberal subject, regarded as the model of the human since the Enlightenment, into the posthuman (1999, p. xiv).

What Hayles claims above is that altering the boundaries between human and machine cannot help but alter identities. Indeed, this line of thought is consonant with the Suchman epigraph opening this chapter, which suggests the possibility of ‘new agencies and accountabilities effected through reconfigured relations of human and machine’ (2007, p. xii).

Thus, I suggest that within these two lines of thought that typify concerns found in the literature regarding human involvement with computational objects, the former focuses on the regulative role of technology while the latter attends to the changing character of the subject. Consequently, between these lies a *continuum* where I suggest that relations between humans enacting leadership practices through computational objects can be located. While one line of thought looks to technology as a structuring force, the other explores the ways in which the subject is transformed in relation to technology. In the simplest possible terms, the former signals the role of structure while the latter explores new possibilities for agency. Thus, between these lines of thought lies also the terrain of the central academic debate between structure and agency in the social sciences (Astley and Van de Ven 1983, pp. 251-253).

It is through these concerns that I propose the following research questions to guide an initial mapping of the unexplored terrain between leadership practices and computational objects (Lowe and Gardner 2001, pp. 501-502):

1. What roles do computational objects play in the enactments and possibly the creation of leadership practices?
2. How do informants’ perceptions and use of computational objects align with respect to the constitution, (re)production, and articulation of leadership practice?

3. How is 'leadership' produced and recognised *qua* 'leadership' in practice?

These research questions are not only derived from extant theory exploring the specifics of human involvement with computational objects, but as explained above, they are also relevant to a much broader debate in social theory regarding the relation between structure and agency. As such, they guide the collection of data that will allow the findings offered by the present research to contribute to specific literatures within leadership, HCI, and IS, but also respond to the broader purview of social theory where specific calls for exploration of technologies in relation to organisational settings have also been issued (Ashcraft et al. 2009, p. 20).

1.4 Content and Format of the Present Research

The aim of this research is to interrogate the 'unexplored area' (Kahai 2012, p. 102) between leadership practices and computational objects, thereby 'opening up the technology black box [...in order to] discover new insights into how the Digital Age is affecting leadership' (*ibid.*).

As an area of study where scant research exists, it falls into a category for which Eisenhardt recommends an iterative approach to theory induction based on the case study (1989, p. 532) and for which Lee suggests such studies provide an environment for 'natural experiments' which integrate ideographic and nomothetic approaches to the production of scientific knowledge (1989, p. 119). Further, as Ragin notes, 'thinking without comparison is unthinkable' (1989, p. 1), suggesting that a comparative case study can elucidate observed variations in leadership practices and modes of engagement with computational objects. Moreover, as a study designed to understand leadership practices, it follows an anthropological tradition, suggesting an ethnographic methodology (Boellstorff et al. 2012; Dourish and Bell 2011; Szymanski and Whalen 2011b, pp. 61-91). Such an approach, as described in section 1.2.3, also emphasises practice theory (PT) (Nicolini 2012; Reckwitz 2002; Schatzki 2002; Shove et al. 2012a).

The majority of the empirical data collected for the study has been derived through observational fieldwork with organisations at their offices in London and Silicon Valley, based to a large extent on the shadowing (Czarniawska 2007; Nicolini 2012) of formal leaders, 'tracing the associations between human and non-human elements and studying the effects that the resulting arrangements make in the world' (Nicolini 2010, p. 1394). The research is further enriched by extensive interviews (Whyte and Whyte 1984, pp. 97-111; Alvesson 2011a) as well as a variety of virtual methods (Boellstorff et al. 2012). Through this array of methodologies, the research provides a grounded empirical base from which

analysis of relations between leadership practices and computational objects can be undertaken.

For this purpose, a number of multinational corporations granted me access to their sites in both the UK and US over a period of two years. Details of the various methodological and site selection choices are elaborated further in chapter 3. Through an intensive investigation, a variety of circumstances unfolded for which I was present, revealing key features and implications for the enactment of leadership practice through computational objects. Further, as detailed in chapter 2, these have been analysed against a theoretical framework I have synthesised based on the work of leadership scholars Grint (2005a) and Kempster et al. (2011). As I will show in chapter 2, leadership studies are filled with debate about what ‘leadership’ actually means; however, the framework of leadership dimensions I propose have the benefit of being those for which extant leadership theory easily map onto, thereby providing a theoretical base to integrate with, rather than deviate from general leadership theory.

Thus, the overall objective of the research is to produce a high-quality exploratory and comparative case study to generate a theoretical understanding of leadership practices in modern organisations that includes the role of computational objects.

1.5 Organisation of This Dissertation

This study is presented in the following order: Chapter 2 situates this work within prior research at the intersection of studies on leadership, HCI, and IS. Moreover, within chapter 2 I present a survey of the extant theories of leadership that frame how I plan to study it, and offer a fivefold framework based on the work of leadership scholars Grint (2005a) and Kempster et al. (2011) to study leadership *in situ*. I then situate the study of leadership within the broader arc of social theory and discuss in greater detail the social theories that I will mobilise in this study. In this fashion, both the present chapter and chapter 2 lay the theoretical and meta-theoretical groundwork for the study. Chapter 3 then sets out the rationale and attendant details for the methodological and site selection choices that have been made in conducting the study.

The next three chapters present the empirical material from three distinct viewpoints. Chapter 4 offers an exploration of leadership practice in an unlikely location: two programmers engaging in the material-discursive practice of pair programming (Williams 2001). I call this location unlikely, for within the human dyad of the ‘pair’ there are no formal leaders. Yet, I suggest that it provides an ideal location to interrogate the construct ‘leadership’, for as the chapter reveals, it provides a compelling account of how leadership is enacted through material-discursive practice, even in cases where there is no formal

‘leader’. What I show in this chapter is that leadership is manifested even in the interactions of a human dyad where there are no formal leaders. Moreover, the cases presented in this chapter build an empirical foundation for what it might mean for a computational object to lead.

Chapter 5 focuses on material-discursive practice of emailing by formal leaders and the outcomes of such human-computer interactions. Specifically, by closely examining formal leaders’ material-discursive practice with computational objects, I demonstrate that what we construe as ‘leadership’ is deciphered as a ‘nexus of practices’ (Schatzki 1996, p. xi). This conceptualisation of leadership-as-practice (LAP) (Carroll et al. 2008; Crevani et al. 2010; Endrissat and Arx 2013) is much less attached to an individual and much more dependent on various approaches to—and therefore distributions of—material-discursive practice (Barad 2007, p. 178; Nicolini, Mengis et al. 2011, p. 8; Shove et al. 2012b). Here, I draw attention to the way in which such distributions also include the apparatus of computational objects.

In Chapter 6, I am guided by the call of Sandberg and Tsoukas (2011) to employ *breakdowns* as a site for understanding the relationship between leadership practice and computational objects. To locate breakdowns in the literature, I briefly review the various approaches to studying breakdowns in the extant literature to develop a useful framework. This perspective enables me to explicate the relationship between leadership practices and computational objects from a perspective that differs from the previous two empirical chapters. In particular, this theoretical scaffolding allows my analysis to elucidate the ways in which leadership practices are enacted through—and their dependency on—computational objects, while simultaneously highlighting the role of human decisions in these enactments.

Then, in chapter 7, I take a step back and synthesise the findings presented in the three empirical chapters, reflecting and diffracting (Barad 2007, pp. 86-94; Nicolini and Roe 2014) these through both the empirics and extant theory. Within this concluding chapter, I integrate the various points raised by the dissertation and summarise its overall implications, limitations and contributions, and areas for future research.

More specifically, in chapter 7, I detail the various findings throughout the empirical chapters and explore their implications. These include how leadership is understood and recognised by members, how leadership is distributed across people *and* objects, and, perhaps most radically, what the study reveals about human choice, agency, and their relation to an anthropocentric perspective. Here, I present an apparent paradox, namely, that some material-discursive practices are recognised by members as leadership, while other, functionally equivalent practices, most often enacted by computational objects, go unrecognised as leadership practices. In this sense, building on Grint and Woolgar’s sceptical

constructivism (1997, p. 143), what this study explores are possible versions of ‘leadership’, some of which are recognised by members as such, and some of which may go unrecognised. The implications of these findings are then discussed in relation to the extant literature.

Significantly, within chapter 7, I present a range of roles built on Ihde’s human-technology relations (1990) and analysed from the empirical data in this study. These roles provide a framework to explain *how* computational objects support enactments of leadership practice. Building on this, I then present a detailed original theory that explains leadership as a processual phenomena produced through citation (1993 / Butler 2011, pp. xxi-xxiv; Derrida 1977, p. 18) in material-discursive practice. In this theory, leadership, rather than standing as a phenomenon *per se*, acts as a ‘symbolic resource’ (Ailon-Souday and Kunda 2003), standing for particular values within the context of a community, such as an organisation. Thus, I argue that leadership, when recognised, always stands for something else for which the word ‘leadership’ is a proxy or container. As a symbolic resource, I insist that such leadership always points to an underlying process of categorisation (Bowker and Star 1999) of value and worth (Boltanski and Thévenot 2006).

However, a citational theory of leadership alone does not address all of the observed phenomena that, following Grint and Woolgar’s sceptical constructivism, *could* be understood as leadership. For this reason, and also within chapter 7, the study offers a parallel theory of *posthuman* leadership to explain those enactments of computational objects that appear to produce functionally equivalent engagements and results as recognised leadership practices, yet, are not recognised as leadership by group members. In other words, starting from the observation that humans tend to overlook computational objects and their roles in leadership practices, I explain how this reveals a disjunction of responsibility from authority in the delegation of authoritative roles to computational objects. This leads to a theory of *posthuman* leadership that provides a cogent explanation as to why humans do not consider what computational objects do as leadership, but, more importantly, explains how various situations come about, where people find themselves ‘at the mercy’ of computational systems without ever realising it. This is amply evidenced by a wide range of large-scale computational system failures (Nicas and Carey 2013; US Commodity Futures Trading Commission and US Securities & Exchange Commission 2010).

Through these theoretical contributions, chapter 7 brings to bear a detailed theoretical perspective that both explains the production of leadership and includes the role of computational objects in leadership practices.

Chapter 2

The Ideologies of Studying Leadership

Language is not only the foundation for the whole faculty of thinking, but the central point also from which proceed the misunderstandings of reason herself (Johann Georg Hamann, quoted in Müller [1898](#), p. 94).

Words can be made to yield a sense in which they mark one of the deepest differences which divide writers and thinkers, and, it may be, human beings in general (Berlin [1953](#), p. 1).

IN THE PREVIOUS CHAPTER, I argued there are significant gaps in leadership research on at least two levels. The first level is that theories of leadership tend to limit themselves to human actants (Latour [1999](#), p. 303), rendering non-humans invisible. I contended that the use of computational objects in globalised business organisations is deeply embedded in everyday experience and that to ignore these in the study of leadership and in the production of its theories is a grave error. The second gap is that there exists a dearth of research on leadership that takes the observed practice of leadership as its unit of analysis. On this point, I claim that a practice theory (PT)-based approach (Nicolini [2012](#); Reckwitz [2002](#); Schatzki [2002](#)) can both inform the development of leadership theory and enable richer understandings. I argued that a research programme that addresses these two gaps will contribute to the field both by extending the theory of leadership to computational objects and by grounding its study firmly in practice.

My research programme is consequently situated at a nexus of knowledge domains, including leadership, HCI, IS, and organisational studies (OS). In this chapter, I begin to focus at the level of theory, engaging with resources from within these various

literatures, while recognising that any position that I take carries with it a certain world-view, or *Weltanschauung* (Staiti 2013, p. 34). One way to describe this is with the concept of ideology (Marx and Engels 1970, pp. 39-40), a concept that Kunda also mobilises in the context of his ethnographic study as:

[B]odies of knowledge that must be understood in the context of the social arrangements within which they arise and which provide the grounds for their assertion (Kunda 1986, p. 54).

Thus, the naming of this chapter is grounded in the position that all knowledges are situated and partial (Haraway 1988; Harding 1991) and, moreover, that they can only be understood through the social contexts in which they are mobilised.¹ This ‘social context’ is the one in which Kunda’s definition of ideology provides the ‘grounds’ that legitimate the ‘assertion’ of ‘bodies of knowledge’ (1986, p. 54). Such a position reveals an ‘ethnographic sensibility [...] in keeping with a hermeneutic-phenomenological stance’ (Yanow, Ybema et al. 2012, p. 367), which I take to be central to my theoretical orientation.

Having presented this foundational aspect of my theoretical view, I explicate below my plan for the remainder of this chapter.

2.1 Organisation of This Chapter

In this chapter I will engage with the following topics underpinning the theoretical aspects of the present work: First I review the extant theories of leadership and frame how I plan to study it (section 2.2). Within this section I present a fivefold framework based on the work of leadership scholars Grint (2005a, p. 18) and Kempster et al. (2011) to study leadership *in situ* (section 2.2.5). I will then discuss the arc of social theory and its bearing on the study of leadership (section 2.3). Within this section I will also describe the key

¹With regard to the term *situated*, Ciborra and Willcocks note that:

[T]he adjective “situated”, the noun “situation”, the Latin expression “*in situ*”, and the abstract concept of “situatedness”, are liberally employed by those researchers and scholars who want to take and articulate alternative approaches to the study of organizations. (2006, p. 129)

In response to this, he points out that the term originates from the phenomenological tradition, specifically in Heidegger (1953 / 1996) and his use of the German word *befindlich*, which, according to Ciborra and Willcocks:

[N]ot only refers to the circumstances one finds himself or herself in, but also to his or her “inner situation”, disposition, mood, affectedness and emotion (2006, p. 130).

Ciborra thus points out that in the scholarly translation from *befindlich* to ‘situated’, crucial dimensions of meaning were lost that may be beneficial to recover. I therefore attempt, within the present work, to include these dimensions of emotion and affect in both the empirics and analysis.

aspects of the social theories I mobilise in this study, actor-network theory (ANT) (Latour 2005) and Barad's agential realism (1997, 2003, 2007) and Ihde's conceptualisation of human-technology relations (1990). I then close the chapter by drawing conclusions and a description of the course this dissertation will take (section 2.4).

Despite my attempts to make this chapter as concise as possible, there are a number of key topics that must be addressed in order to lay a proper foundation for the empirical chapters to come. One exception to this, however, is found in chapter 6, where I discuss the extant literature on breakdowns. My reasoning is that this particular theoretical material is specific to that chapter, however, for continuity, I point out to the reader that this material can be found in section 6.2.

2.2 Leadership

Despite the current prominence of leadership (Jackson and Parry 2011, p. 2), the literature on leadership is both exceptionally broad (Palmer and Hardy 2000, p. 230) and highly debated (Ladkin 2010, p. 75; Palmer and Hardy 2000, p. 233). In this section, I engage with this extant literature on leadership in order to lay out a sense of its historical emergence. I begin with brief summary of the study of leadership before the twentieth century (section 2.2.1). I then summarise the study of leadership up to the present day (section 2.2.2). I then move on to the question of defining leadership (section 2.2.2.1) and current debates in the study of leadership (section 2.2.3). Following this, I propose moving beyond such debates through an approach to studying leadership *in situ* based on the work of Grint (2005a) and Kempster et al. (2011) (section 2.2.4).

2.2.1 The Pre-Modern Era

One setting to place the emergence of leadership is at the dawn of recorded history, specifically, at the appearance of writing. This is a history written primarily by its winners (Grint 2010a, pp. 33-34) in a historical era when war was central to the practice of leadership. Thus, we find works such as Kauṭīliya's *Arthaśāstra* (circa 4th century B.C.E. / 1967), Sun Zi's *Art of War* (circa 2nd century B.C.E. / 2003), Plato's *Republic* (circa 380 B.C.E. / 2000), and Machiavelli's *The Prince* (1513 / 2008), all of which offer perspectives on what leadership meant to those authors at the time of their writing (Grint 2010a, pp. 33-49).

Much of the leadership literature in this period was written professionally at the command of powerful state rulers. For example, Grint cites the histories of Alexander and Julius Caesar as examples of such commissioned works (*ibid.*, p. 33). Grint also points out that the stories that were documented tend to contain narratives that are considered 'interesting', that is, where something important occurs. This suggests that the accounts

available to us on the study of leadership from the pre-modern era are biased in favour of the powerful and omit the mundane, and thus place our present-day understandings of leadership from the earliest times in a relation with Foucault's concept of *discursive practice*, as a:

[B]ody of anonymous, historical rules, always determined in the time and space that have defined a given period, and for a given social, economic, geographical, or linguistic area, the conditions of operation of the enunciative function (1969 / 2002, p. 117).

Thus, while these writings are without doubt the products of societies and their attendant world view, or *Weltanschauung* (Staiti 2013, p. 34) in place at the time of their conception, the pre-modern leadership literature also forms an important basis for our own modern-day starting points in the study of leadership. These historical texts describe leadership as authoritarian, almost universally embodied in a man, often involving military operations and to this extent, offer prescriptive advice on wars and how to win them.

2.2.2 The Modern Era

In the present era, according to Guillén, leadership as a topic of academic enquiry emerged out of the discipline of sociology and its interest in the phenomenon, as observed in organisations, political parties, and nation-states (2010, p. 223). Within his analysis, sociology dominated the published study of leadership up until the 1970s, when the disciplines of business,² political science, and, most notably, psychology began to produce more leadership studies. To support these claims, Guillén offers a chart, rendered in figure 2.1. To corroborate these findings, I produced a chart using the online citation analysis service, *SciVerse Scopus* (Elsevier 2012), which, as shown in figure 2.2, reveals a similar pattern of exponential growth associated with the topic of leadership.

These data underscore two important points. First, they show how young the academic field of leadership is in comparison to more established bodies of knowledge such as philosophy or mathematics. Next, they highlight important academic disciplinary boundaries or, as some argue, reveal a disciplinary *parochialism* in the approach of studying leadership (March 2005; Boyacigiller and Adler 1991). While each discipline brings particular approaches to their production of knowledge that both enable and constrain the types of questions and answers each can offer, none are capable of answering all questions (Packer 2010, pp. 17-41; Giddens 1974, pp. 1-22; Terjesen and Politis 2015, p. 151). It is for

²As established by the professionalisation projects of the late 1800s (Khurana 2010, Part I) and the specialisation of education that ensued in the twentieth-century (Zurcher 1996).

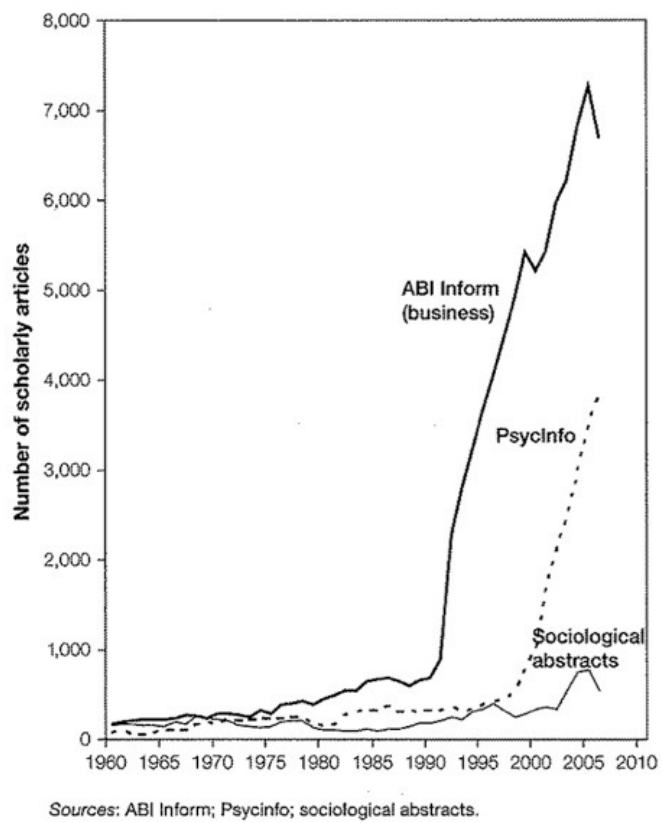


Figure 2.1: The Scholarly Literature on Leadership in the Fields of Business, Psychology, and Sociology (Guillén 2010, p. 224)

these reasons I argue that the application of a broader spectrum of disciplinary approaches to the topic of leadership can help to broaden our understanding.

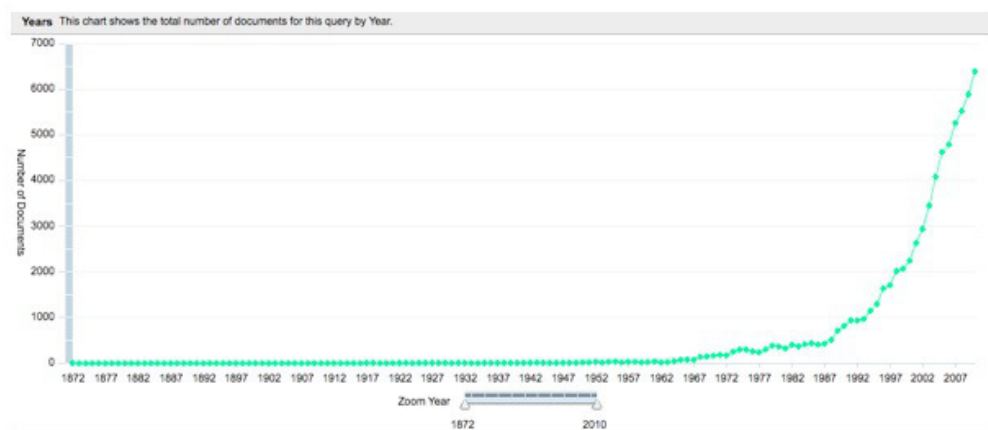


Figure 2.2: Analysis of Scholarly Literature on Leadership: 1872-2010. (Elsevier 2012, custom search)

Notwithstanding the sheer quantity of publications that can be taken as an indication of the importance leadership holds for researchers and their sponsors, the exponential growth in publications in the 1990s, proximal to the time that the Internet was commercialised, is a particularly interesting data point. Indeed, while scholars have noted a marked rise in the academic growth of leadership as a discipline (Brungardt et al. 1998; Rost and Barker 2000), few have linked this growth of leadership to attendant changes in computational technology. This is a motivating insight for the present study.

The early twentieth-century work-practice innovations and ideologies of Fayol (1917), Ford (Gilbert et al. 1992), and Taylor (1903; 1911) were inextricably linked to the attendant Industrial Age mechanisms available to them (Yates 1993, p. 9). Thus, it follows that further development of (computational) technologies bring new modes of work practice innovation and production, as well as a redefinition of working roles (Zuboff 1988, p. 16). Some suggest that this material interplay is a fundamental, processual, and ongoing phenomenon of manifest existence (Barad 2003, p. 822), marking a refiguring of practices and objects (Suchman 2005, p. 383), which must also include the practices of leadership. This leads us to what Barad calls ‘material-discursive practice’ (2007, p. 178), the location where both the materiality and meaning of practices are co-constituted.³ I therefore use this theoretical term interchangeably with the term ‘practice’ throughout this work, where the term material-discursive practice calls particular attention to the often invisible material and discursive elements present in the enactment of practice.

³For an elaboration of material-discursive practice, see section 2.3.7.2 beginning on page 66.

2.2.2.1 What is Leadership?

Given this background, one may well ask, paraphrasing Ladkin (2010, p. 1), ‘What is this phenomenon associated with the word “leadership”?’ According to Bass, ‘Leadership is one of the world’s oldest preoccupations’, inscribed in ancient Egyptian hieroglyphics and mythologised in ancient texts such as the *Iliad* and *Beowulf* (1990c, p. 3).⁴ Meanwhile, Van Seters and Field describe leadership as a ‘complex and multifaceted phenomena’ that was conceptualised ‘even before biblical times’ (1990, p. 29).

Definitions as Shifting Sands As ancient as the concept of leadership may be, time has not served to sediment any single definition. *The Oxford English Dictionary* reports the word ‘leadership’ was only brought into use in 1821 with the phrase ‘*Leadership of the Opposition*’ (OED Editors 2011), that is, in a political context. In 1870, use in a military context was employed as ‘*Nothing is wanted but military leadership and military means*’ (*ibid.*). A legal context makes its appearance in 1885 as ‘*the leadership of a great circuit*’ (*ibid.*). But it is not until 1933 that the word ‘leadership’ is related to organisational life as ‘*the substitution of morale for discipline and of integration for domination calls for a change in the quality of leadership in industry*’ (*ibid.*). This etymological progression, according to the OED editors, is notable on a number of levels, not least of which that political, military, and legal use preceded and possibly informed the idea of leadership as it is now organisationally conceived. Further, it highlights the fact that industry-centric organisational life has itself only recently come into being. Moreover, academic research focusing specifically on the topic only formally commenced in the twentieth-century (Bass 1981 cited in Van Seters and Field 1990, p. 29). This places the academic study of leadership at a little more than 100 years old.

On this youthful enterprise, Rost found 221 definitions of leadership found in over 587 ‘books, book chapters, and journal articles which, by title, indicated that they were primarily concerned with leadership’ (1993, p. 44) from 1900 to 1990.⁵ His review included authors from the United States, Canada, Australia, and various European countries, noting in agreement with Guillén that publications from ‘European countries increased dramatically in the 1970’s and 1980’s’ (*ibid.*). Note, however, that at the time of Rost’s writing, publications were in the midst of what, in hindsight, can be seen as the greatest period of

⁴Across his wide survey of religions and cultures, Campbell has asserted the myth of the hero embeds a similar narrative structure, represented as the ‘rights of passage: separation - initiation - return: which might be named the nuclear unit of the monomyth’ (2004, p. 28). This conception of a culturally universal heroic ‘monomyth’ may help to explain why the idea of the leader as hero has appeared at various stages in the development of the scholarship of leadership, often persisting in the face of ill effects that may attend it (cf. Padilla et al. 2007; Tourish 2013).

⁵Rost notes that 366 of the 587 analysed sources (62%) did not define leadership at all, further adding to the ambiguity of the term.

Definition	
❶	Leadership is 'the behavior of an individual [...] directing the activities of a group towards a shared goal' (Hemphill and Coons 1957, p. 7).
❷	Leadership is 'the influential increment over and above mechanical compliance with the routine directives of the organization' (Katz and Kahn 1978, p. 528).
❸	'Leadership is exercised when persons [...] mobilize [...] institutional, political, psychological, and other resources so as to arouse, engage, and satisfy the motives of followers' (Burns 1978, p. 18).
❹	'Leadership is realized in the process whereby one or more individuals succeed in attempting to frame and define the reality of others' (Smircich and Morgan 1982, p. 258).
❺	Leadership is 'the process of influencing the activities of an organized group toward goal achievement.' (Rauch and Behling 1984, p. 46)
❻	'Leadership is about articulating visions, embodying values, and creating the environment within which things can be accomplished' (Richards and Engle 1986, p. 206).
❼	'Leadership is a process of giving purpose (meaningful direction) to collective effort, and causing willing effort to be expended to achieve purpose' (Jacobs and Jacques 1990, p. 281).
❽	Leadership 'is the ability to step outside the culture [...] to start evolutionary change processes that are more adaptive' (1985 / Schein 2004, p. 2).
❾	'Leadership is the process of making sense of what people are doing together so that people will understand and be committed' (Drath and Palus 1994, p. 4).
❿	Leadership is 'the ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organizations of which they are members' (House, Hanges et al. 1999, p. 184).

Table 2.1: Ten Definitions of Leadership (adapted from Yukl 2009, p. 3)

growth. Moreover, according to the most recent data, as shown in figure 2.2, this growth shows no sign of abating. To wit, 10 such varied definitions are displayed in table 2.1 as compiled by Yukl (2009, p. 3). These varied formulations offer the reader a sense of the great variety of perspectives that leadership scholars have adopted in their study of the phenomenon, for example, associating leadership with influencing others, organisational change, shaping meaning, and the accomplishment of goals.⁶

Further, in examining a wide range of surveys and reviews on the study of leadership (Bass and Bass 2008; Bryman et al. 2011; Czarniawska 2008, pp. 65-77; Day, Fleenor et al. 2014; Dinh et al. 2014; Gibb 1954; Grint 2011; Jackson and Parry 2011; Northouse 2009; Van Seters and Field 1990; Palmer and Hardy 2000, pp. 228-258; Schwandt and Szabla 2007; Van Knippenberg, Knippenberg et al. 2004; Yukl 2009), it becomes readily apparent that different scholars conceptualise the field quite differently. Where Yukl's leadership text (2009) is ordered by the aspect of leadership studied (e.g., managerial traits in one chapter; gender, diversity, and cross-cultural leadership in another), the Sage Handbook of Leadership (Bryman et al. 2011) instead groups its material by disciplinary perspectives (e.g., sociological perspectives in one section, psychological perspectives in another). These dif-

⁶Moreover, they do not even begin to step into a larger debate of distinctions between leadership and management, a debate that is beyond the scope of this dissertation. This study is concerned with practices that members refer to as leadership. However, for an excellent overview and discussion of extant distinctions, see Ladkin 2015.

ferences show that the story of leadership literature can be told in various ways, depending on the authors' perspectives and intentions. Moreover, these differences belie ideological distinctions. Metaphorically, the former signals an *objective* ideology where leadership can be likened to an animal that can be dissected and each part individually identified, while the latter suggests a *pluralist* ideology that likens disciplinary perspectives to a set of coloured glasses that can be donned by the researcher, where leadership then appears in a form revealed by the glasses. From this vantage point, definitions of leadership are like shifting sands: nothing can be taken for granted.

My own interests are more aligned with the latter approach, and yet, I must also concede that the dominant stratagem in the leadership literature tends to organise theoretical periods in a linear fashion—presenting the theoretical development itself as a phenomenon that is clear and well marked. As a result, the majority of scholars in my review have represented the major periods of leadership theorisation in a linear fashion, as per Palmer and Hardy's (2000, p. 231) five broad categories, shown in figure 2.7.

Indeed, even with scholars such as Palmer and Hardy, whose critical work highlights key debates in managerial and leadership discourse, while simultaneously displaying a sensitivity to complex power and political relations in organisations, chose to represent leadership as a linear progression (*ibid.*, pp. 228-258). A summary of their analysis of leadership theory is rendered in table 2.3.

Contra the flattened linear, Van Seters and Field's evolutionary perspective as shown in figure 2.6 provides a more complex perspective on the development of leadership theory.⁷ Their analysis of extant theory suggests that 10 eras (each with its own sub-periods) of leadership theorisation are discernible across four dimensions of *Behaviour, Personality, Influence, and Situation*.

Van Seters and Field's analysis is significantly more detailed, both in terms of depth and breadth than Palmer and Hardy's suggestion of five schools of leadership as shown in table 2.3. In contrast, Van Seters and Field's nuanced analysis reveals relationships and linkages *between* various movements in the development of theory in a way that other formulations do not.

⁷My position here is that an evolutionary perspective is neither 'more' correct nor true (McKelvey 2003) than any of the other views that have been put forward by leadership scholars, including framings that emphasise philosophical (Ospina and Uhl-Bien 2012), political (Grint 2010a, p. 48), sociological (Guillén 2010), disciplinary (Bryman et al. 2011), discursive (Western 2007, pp. 80-85), practice theory (PT)-based (Day 2000), thematic (Nohria and Khurana 2010, p. 7), and quantitative (Hiller et al. 2011; Brutus and Duniewicz 2012) aspects. These positions co-exist and serve to add useful detail/challenge the more dominant approaches (c.f. Avolio, Walumbwa et al. 2009; Bass and Bass 2008; Chemers 1997; House and Aditya 1997; Northouse 2009; Yukl 2009). Indeed, there are as many approaches as scholars themselves. My perspective is that having a range of diverse perspectives available increases possibilities for broader and deeper understandings (Turtle and Papert 1992; Mitchell 2004).

2.2.3 Debates in the Study of Leadership

Given the apparent ‘slipperiness’ (Alvesson and Spicer 2011b) of the term ‘leadership’, I would like to focus briefly on Van Seters and Field’s *anti-leadership era*, as it brings to the fore some of the strongest debates within the field that inform my study.

Van Seters and Field’s Anti-Leadership era is genealogically positioned in their analysis as descending from the fourth *Situation era* and the fifth *Contingency era* (1990, p. 37). It occurs from the late 1970s and extends through the present. Its key influence within the arc of social theory (see section 2.3) is the move of *contextualising the subject*, and there is evidence of a poststructuralist ontology that asserts the discursive production of the subject and an acknowledgement of the limits of what can be known.

According to Van Seters and Field, in the latter half of the 1970s, while copious empirical studies had been conducted to test the various theories developed through successive eras:

[T]he results were less than conclusive, and a sentiment arose that perhaps there was no articulable concept called leadership. It seemed as though so many variables in the leadership equation had been explained that they explained nothing at all (*ibid.*, p. 36).

Out of these conditions ‘there arose an era of “Anti-Leadership”’ (*ibid.*). They divide this era into two periods: the *Ambiguity period* and the *Substitute period*. The former looks to situational variables in a novel fashion—introspectively, in that it marks the beginning of an ongoing period of reflection and critique of both the concept of leadership and the methods used to study it. The latter period explores behavioural practices, normative structures, and artefacts that may displace traditional leadership functions. These theoretical developments hold important implications for the present research.

Given the import of the choices a researcher makes in how he or she observes his or her object of research (Seidl and Becker 2009, p. 208; Nohria and Khurana 2010, p. 19), the former period is vital to consider. Further, given that my research seeks to explore relationships between computational objects and leadership practices, the latter period is also important as it sets a precedent for the inclusion of artefacts in the theory of leadership. Crucially, these periods tend to be overlooked in *linear* reviews and, if they are included, it seems mostly in passing. In contrast, Van Seters and Field (1990) appear to give a broader range of theoretical developments greater representation. This inclusion, and ostensibly more balanced reporting, is a key factor in my choice to frame my review through their perspective.

Recounting his own experience of living through this era as a leadership scholar, Hunt reports that:

[T]o be active in the field as I was in the 1970s and 80s was to question its survival as a serious area of academic interest. A number of us became very concerned. First we defended it (Hunt and Larson 1975), but as the critical crescendo continued, we began to have doubts ourselves (1999, p. 130).

Here, Hunt describes an era where leadership scholarship was subjected to an intense critical scrutiny that included its members and threatened the future of the discipline. Even the proponents, according to Hunt, were driven to reckon their positions.

For during this period, a number of key papers directly challenging the construct of leadership itself appear, first among them Miner's (1975), found in the very same volume Hunt refers to as his initial defence above. In his critique, Miner suggests that:

[W]e abandon leadership in favor of some other, more fruitful way of cutting up the theoretical pie (*ibid.*, p. 200).

In this work, Miner radically suggests a theory of control over one of leadership and offers four types of control (*ibid.*, pp. 201-204) as a starting place.⁸ This line of argumentation sits along the well-trodden debate of a distinction between 'leadership' and 'management' (cf. Bedeian and Hunt 2006; Korica, Nicolini et al. *under review*; Ladkin 2015; Simonet and Tett 2013). Within this study, I circumvent this issue by focusing analysis not on what scholars think the differences between these terms might be but by instead looking to how members endogenously produce a phenomenon they refer to as 'leadership' (Szymanski and Whalen 2011a, p. 6).

Also notable here is Miner's discussion of *task control*, including the concepts of 'push' and 'pull', where push is the type of work presented on an assembly line for which the worker has no control and pull is characterised as being achieved through job enlargement (1975, p. 204). These concepts significantly predate lean manufacturing (Cusumano 1985; Ōno 1988), and yet seem to anticipate it.⁹

Following Miner, Pfeffer (1977) offered a similar critique, charging that there were three problems with the concept of leadership:

⁸These are 1) hierarchical control, 2) professional or ideological control, 3) group control, and 4) task control. Miner's claim is that in comparison to leadership, *control* is more meaningful theoretically and 'offers more powerful analytic tools to those who are primarily concerned with the organizational, as opposed to small-group, level of analysis' (1975, p. 206).

⁹The emphasis on pull-based work systems, for example, through the use of 'Kanban', is argued to be central to the just-in-time (JIT) production system (Ōno 1988, p. 29). Kanban is a Japanese word meaning 'sign' or 'placard' (*ibid.*, p. 27). A kanban system is a way of organising work such that the information about a task that needs to be done is represented on a distinct object such as a paper card that might be tacked to a (kanban) board. These cards are then on display to a group of workers, and the workers are then free to choose the cards they want to work on (Poppendieck and Poppendieck 2003, p. 72). Such a system is said to possess pull, rather than push qualities that 'create appropriate signaling and commitment mechanisms, so that teams can figure out for themselves the most productive way to spend their time' (*ibid.*, p. 74).

1. Ambiguity in definition and measurement;
2. The question of whether leadership has appreciable effects on organisational outcomes;
3. The selection process for leader succession, which often applies ‘organizationally irrelevant criteria and which has implications for normative theories of leadership’ (1977, p. 104).

In the face of these concerns, Pfeffer argues that leadership, rather than being a discrete phenomenon, is a one projected through psychological attribution (Calder 1977) by people toward objects of perceived leadership. He therefore suggests that a more fruitful direction for the study of leadership is to investigate the *process* of how these attributions are made (Pfeffer 1977, p. 104). Crucially, he argues that leadership studies aiming to elucidate the ‘process of attributing leadership’ (*ibid.*) would be useful contributions to knowledge. And yet, this is not an approach that has been taken up in any serious way in the 38 years since it was proposed. For this reason, Pfeffer’s aim of elaborating the process of *how* leadership happens in practice in the first place is one I take as central to the goals of the present research. Attribution theory (cf. Calder 1977; Harvey et al. 2014; Martinko et al. 2007), however, is a psychological concept that places the activity of attribution within the mind of the individual. This is not a view of cognition I share. Instead, I take a different line towards cognition, following Hutchins (1995a), who convincingly argues that cognition is a distributed, socio-technical, and performative phenomenon. Specifically, Hutchins argues that cognition is:

[N]ot determined entirely by the information processing properties of individuals [...nor can it be] inferred from the properties of the individual agents alone, no matter how detailed the knowledge of the properties of those individuals may be. [Rather, cognition] is produced by a system that typically includes [...humans] interacting with each other and with a suite of technological devices (1995b, p. 265).

I ask the reader to note the parallelism with which this argument aligns with Barad’s view that all phenomena, more generally, are productions of ‘the mutual constitution of entangled agencies’ (2007, p. 33). These ideas will be elaborated in section 2.3.7.2.

Returning to Pfeffer, to further underscore the influence of the move within the arc of social theory of *contextualising the subject* (see section 2.3), he asserts that:

[A]nalysis of leadership and leadership processes must be contingent on the intent of the researcher (Pfeffer 1977, p. 111).

Pfeffer here is signalling that researchers are no longer searching for some given truth, but rather, they discursively produce it through their intent and subsequent actions.

Concurring with Pfeffer's attributional position, Mitchell, in his review of organisational behaviour, notes that paradigmatic shifts in leadership theory suggest that 'leadership is in the mind of the observer' and is 'essentially a perceptual construct' (1979, p. 269).

These views, Van Seters and Field (1990) argue, challenged the foundations of leadership scholarship and are indicative of the Ambiguity period as depicted in figure 2.6. Further, they assert that this period has not been a passing fad; it has persisted and continued to grow. Van Seters and Field credit this period with fostering the work of Meindl et al. (1985), who introduced the concept of *The Romance of Leadership*, where 'leadership is actually an encompassing term to describe organisational changes that we do not otherwise understand' (Van Seters and Field 1990, p. 37).

Another continued stream of research that questions the construct of leadership has come from scholars identified with critical management studies (CMS). For example, Alvesson and Willmott make the case for a critical approach to the study of management and include leadership under this remit (1996, p. 17). Palmer and Hardy (2000, pp. 228-258) question whether leadership is a myth or a villain and Berry and Cartwright's work (2000) on the critical construction of leadership also falls into a similar category. Later, Alvesson and Svenningsson suggest that the study of leadership, when closely examined, disappears, arguing in line with Pfeffer that:

[L]eaders and leadership can then be seen as organizational symbols, the orientations toward them are then not treated as facts about leadership, as such, but more as clues to understand organizational cultures (Alvesson and Svenningsson 2003a, p. 365).

While not refuting leadership entirely, Alvesson and Svenningsson suggest that it may be an altogether different kind of phenomenon than previously hypothesised. To explore this possibility, they advise a methodological approach to the study of leadership that emphasises the:

[E]xploration in depth of what people mean, combined with a considerable openness for—without a privileging of—incoherence, variation, and fragmentation (*ibid.*, p. 378).

For this purpose, they recommend ethnographies. This theme of 'disappearance' in leadership is further explored as 'slipperiness' (Alvesson and Spicer 2011b) and most recently, Alvesson and Spicer (2012) have formally suggested the idea of *Critical Leadership*

Studies, presumably a version of critical management studies (CMS) tailored for this study of leadership and emphasising performative and critical positions.

Also, while not part of the critical stream *per se*, Ladkin (2010), in alignment with Alvesson and Svenningsson (2003a), has similarly argued for a reorientation toward the study of leadership by asking a different set of questions. For example, she suggests that:

[R]ather than asking ‘What is leadership?’, the question, ‘How might we understand leadership as a phenomenon?’ is posed (2010, p. 1).

For Ladkin, the approach to study leadership is phenomenological and one that cannot be separated from the environment in which it naturally occurs. She argues, for example, that:

If the nature of a thing is such that when removed from the environment in which it naturally occurs it alters radically, you will not glean an accurate account of it by examining it within laboratory conditions [...] Understanding the nature of leadership as a phenomenon brings an appreciation of the landscape in which it occurs, encourages us to consider the air it breathes, the environment which feeds it, as well as its distinctive occurrence (*ibid.*, pp. 14-15).

Thus Ladkin, like Alvesson and Svenningsson (2003a), argues strongly for the study of leadership *in situ* in order to better understand how it comes about, how it is sustained, and what makes its enactment distinctive.

Of late, a number of scholars have mobilised the methodological direction Alvesson and Svenningsson (*ibid.*) and Ladkin (2010) point toward under the rubric *leadership-as-practice* (LAP) (cf. Carroll et al. 2008; Crevani et al. 2010; Denis, Langley and Rouleau 2010; Endrissat and Arx 2013; Perillo 2008). This work takes the *strategy-as-practice* stream (cf. Chia and MacKay 2007; Jarzabkowski 2005; Jarzabkowski and Spee 2009; Seidl and Whittington 2014; Tsoukas 2010; Vaara and Whittington 2012) and its reliance on practice theory (PT) (cf. Nicolini 2012; Orlikowski 2010; Reckwitz 2002; Schatzki 2002; Shove et al. 2012b) as theoretical guides. I adopt such an approach in my orientation to the study of leadership.

There are also scholars associated with science and technology studies (STS) connected with this stream, as with Grint, who has provocatively explored, among other things, the social construction of leadership (Grint 2005b), whether leadership is an ‘enemy of the people’ (Grint 2010b), and whether our relationship with leadership is an addiction or an allergy (Grint 2010c).

Kelly (2008), summarises this burgeoning direction in leadership research, citing a ‘growing number of scholars disaffected by the research traditions laid down by leadership psychology’, arguing that there is a turn towards increased ‘interpretive and observational methods in the search for the practices of leadership in everyday life’ (*ibid.*, p. 763).

Thus, as Ladkin (2010, pp. 3-4) and others have argued, what I suggest is an *anti-essentialist* line of argument that is closely related to the STS debate between Kling, Grint and Woolgar on essentialism (cf. Kling 1991a; Woolgar and Grint 1991; Kling 1991b, 1992a; Grint and Woolgar 1992; Kling 1992b). Here, Woolgar and Grint argue that the:

[T]ransformation we need to work toward is a transformation of the nature of social analysis, as a result of which we might transcend the standard ambivalences associated with the technical/social divide. We suspect this will entail nothing short of a major reappraisal of ideas about human nature (1991, p. 376).

Many of the arguments within the Anti-Leadership era seem to share a similar goal.

From such a perspective, the type of phenomenon that leadership is assumed to be has already been decided evidenced by/as a function of the methods employed to study it. The theorists whose work I have reviewed here all call these assumptions into question and, as a result, suggest alternative methodological approaches. Interestingly enough, these various theoretical approaches are converging on the same methodological conclusions that have, for some time, been the ascendant approach to research in human-computer interaction (HCI): the study of practice.

Beginning with Suchman’s seminal work (1987), this scholarly approach to the study of work practice has come to be the dominant approach within HCI for the understanding, design, and implementation of complex sociotechnical systems (cf. Button 1993; Cefkin 2013; Dourish 2001; Dourish and Bell 2011; Engeström 2008; Engeström and Middleton 1998; Kaptelinin and Nardi 2006; Nardi 1993, 1996; Sharrock and Button 2003; Suchman 2007; Szymanski and Whalen 2011b; Tomlinson et al. 2013). Moreover, recent collaborations between those in HCI and organisational studies suggest a recognition of the need for interdisciplinary collaboration and the inclusion of materialities such as the computational objects in the analysis of organisational phenomena (Dourish and Mazmanian 2013; Leonardi et al. 2012). Yet, within the leadership literature, there is scant attention paid to both leadership practices *and* the broader ecosystem of humans and objects that enact the phenomenon of interest.

In parallel to these developments, what are known as practice theory (PT)-based approaches (Nicolini 2012; Reckwitz 2002; Schatzki 2002; Shove et al. 2012a) are closely

aligned. Tomlinson et al.'s (2013, p. 24-6) recent summary of the key propositions put forward in practice theory serve as a useful reference. According to them, these tenets are the following:

1. Practice is routinised embodied action that forms the basis of an activity, whether human or not;
2. Material artefacts shape our relationship with the world;
3. Knowledge derives from and exists within acting in the world, not simply mental representations or symbolic mental categories (*ibid.*, p. 24-6).

Thus, practices, as this study conceives them, are empirically located in embodied action, including those with and between computational objects, forming a traceable network of transformations that represent an emergent, collective phenomenon (Latour 2010a, p. 16).

Further, in addition to asserting particular theoretical points, PT has also come to act as a gathering place for a number of related approaches, including activity theory (Miettinen et al. 2010), ethnomethodology (Larsson and Lundholm 2013), and ethnography (Anteby 2008). In this sense, the stream of work I have just described as associated with HCI can just as easily be viewed as PT-based, as its concerns are with the enactment of practice as the unit of analysis. This, as I mentioned previously, is already a research vector being taken forward in the *leadership-as-practice (LAP)* stream of research (cf. Carroll et al. 2008; Crevani et al. 2010; Denis, Langley and Rouleau 2010; Endrissat and Arx 2013; Perillo 2008).

Here, and relating specifically back to leadership, it is also important to mention a small stream of the leadership literature that goes under the moniker *e-leadership* (Avolio, Kahai et al. 2000; Avolio and Kahai 2003; Bell and Kozlowski 2002; Cascio and Shurgailo 2003; Lowe and Gardner 2001, p. 502; Pulley and Sessa 2001; Yoo and Alavi 2004; Zaccaro and Bader 2003). Proponents of this stream argue that the 'conditions and special circumstances of virtual teams require focused studies of leadership' (Yoo and Alavi 2004, p. 28). In this manner, this stream of research cordons off a particular context of leadership as separate and special, whereas I argue that engagement with computational objects are neither distinct nor special within the organisational contexts this study explores. To this point, I claim that scholars fail to take into account the pervasive and ubiquitous nature of computational objects within globalised organisation. Rather than unnecessarily bifurcating leadership practice into one that involves people face-to-face and another that involves technological partnership, there remains a need at both a practical and theoretical level to defragment these views, leading towards a unitary model of leadership. Indeed, more

recent scholarship on this topic appears to be coming to the very same conclusion (Avolio, Sosik et al. 2014).

In a tangential but related stream of research, a number of leadership scholars have looked more generally at a phenomenon that computational platforms enable, *leading at a distance* (cf. Bligh and Riggio 2012a; Brown and Lightfoot 2002; Hinds and Kiesler 2002; Hooijberg et al. 2007; Weisband 2008). These studies explore the ways distancing effects can be achieved through certain kinds of computationally enabled engagement. Based on its relevance, the present study draws on this literature.

In sum, I suggest that the aforementioned research developments provide a strong basis for an approach to the study of leadership that combines both attention to leadership practices and to the computational objects that inhabit, mobilise, and, in many cases, constitute that practice.

2.2.4 Beyond Debate

Regarding the various (and sometimes hotly debated) perspectives on leadership theory, Grint suggests that consensus on a definition is ‘forlorn and unnecessary’ (2005a, p. 1), and instead offers a fourfold typology as a starting point to capture and allow the co-existence of different ways of understanding leadership, rendered as figure 2.3.

For Grint, scholarly definitions of leadership frame the questions researchers ask, positioning them in relations to an object of research, which he asserts to be one or more of *person*, *result*, *position*, or *process*. A similar approach is subsequently developed in a volume edited by Alvesson and Spicer, where leadership is interrogated through a range of metaphors, including saints, gardeners, commanders, cyborgs, buddies, and bullies (2011a).

2.2.4.1 Living with Essentially Contested Concepts

Consistent with the pluralist views of leadership offered by Grint (2010a, 2005a, 2001), Alvesson and Spicer (2011a), and Denis et al. (2012), Rost argues that the concept of leadership has been appropriated in a variety of ways, changing significantly over time (1993, p. 53), suggesting that it may be similar in function to other societal constructs such as ‘culture’, ‘strategy’, ‘freedom’, and ‘marriage’, arguing that all of these share a polysemic quality. To wit, the suffrage and suffragette movements, the abolition of slavery,¹⁰ the

¹⁰In this case, the idea of ‘master’ as a *leader* and ‘slave’ as *follower* has been irrevocably transformed since the abolition of slavery in Western countries during the 1800’s. This particular example demonstrates that conceptions of leadership are subject to ongoing respecification through particular societies’ changing normative views of what can be legitimately led and under what conditions people should follow. Interestingly, Ruef and Harness have argued that late antebellum writings in journals on slave management are an important point of origin for modern management ideology (2009).

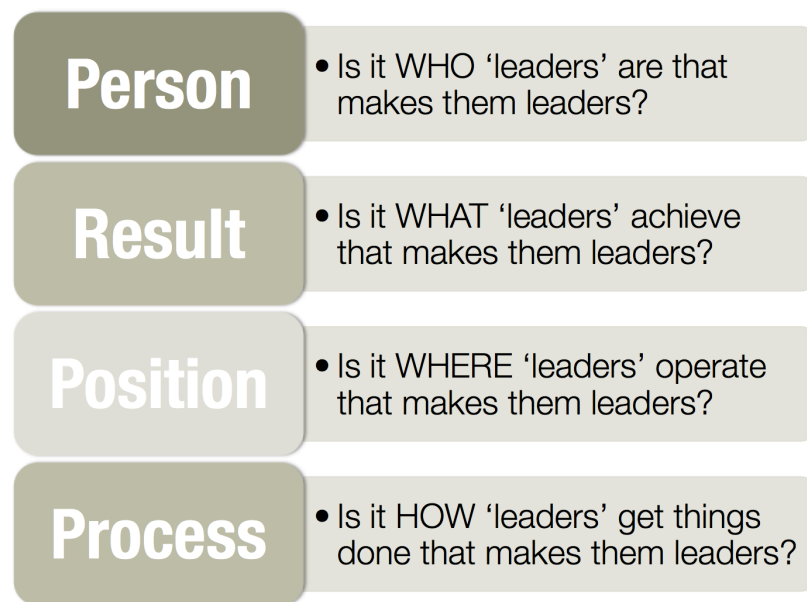


Figure 2.3: Grint's Fourfold Typology for the Ways Leadership Can Be Understood (adapted from 2005a, p. 18)

feminist movement of the 1970's, and recent shifts in the legality of inter-racial and homosexual marriage show that certain terms are subject to changing social norms and, therefore, are subject to ongoing re-specification.¹¹

Reed has also applied this notion of the contested terrain toward organisational theorising as a whole (1999). Here, it is Grint who brings the work of Gallie to our attention by applying the term *essentially contested concept* (ECC) to leadership (Gallie cited in Grint 2005a, p. 1).

Gallie claims that what distinguishes an ECC is first, a disagreement on proper use. But more importantly, he suggests that:

[W]hen we examine the different uses of these terms and the characteristic arguments in which they figure we soon see that there is no one use of any of them which can be set up as its generally accepted and therefore correct or standard use (1964, p. 157).

Thus for Gallie, a plurality of positions, as well as the lack of any categorical definition, appears to be crucial to the existence of the ECC. Examples Gallie provides of such concepts include 'work of art', 'democracy', and 'Christian doctrine' (1956, p. 168). Further,

¹¹Moreover, if one takes Derrida's arguments regarding logocentrism (e.g., presence/absence) seriously, then this argument is extended to all communicative forms (1982, p. 261); all languages, texts, and symbols are subject to ongoing re-specification.

Gallie notes that each group supporting a particular definition of a contested concept sees its interpretation as the correct one and will defend that position with ‘what it claims to be convincing arguments, evidence and other forms of justification’ (1964, p. 157). Grint contends that these conditions apply to the term *leadership* (2005a, p. 1). In my reading, this links to Goffman’s notion of *impression management*, where any allegiance to a particular definition can be interpreted as a function of group membership. Goffman’s precise words on this point are that:

It seems to be generally felt that public disagreement among the members of a team not only incapacitates them for united action but also embarrasses the reality sponsored by the team. To protect this impression of reality, members of the team may be required to postpone taking public stands until the position of the team has been settled; and once the team’s stand has been taken, all members may be obliged to follow it (1956, p. 53).

According to Goffman then, we should expect that within particular domains or organisational stylings, that particular definitions would emerge within those contexts that might not be seen as valid in others. Thus, the US military defines leadership as ‘the process of influencing people by providing purpose, direction, and motivation to accomplish the mission and improve the organization’ (Department of the Army Headquarters 2012, p. 1-1), while the US Council on Competitiveness portrays leadership as ‘depend[ing] on consensus, not hierarchy’ with ‘structures [...] more frequently networked than formalized’ where ‘players move in and out depending on the issues involved’ (2010, p. 7). Leadership, it seems, means different things to different people. But what aim might these disparate meanings hold for proponents who argue so vociferously for their position?

Interestingly, in the context of the essentially contested concept (ECC), Gallie never uses the word *ideology*. However, Kunda’s definition, as presented earlier on page 13, provides a useful basis against which to explore why it may be that particular concepts are contested. Kunda’s notion of ideology helps us to understand that social contexts not only give rise to particular forms of knowledge, but the *products* of these are employed in the persuasion of others. Notably for Kunda, such ideologies can be used not only to persuade, but to control (2006, p. 12).

Sceptical Constructivism The views of Gallie, Goffman, and Kunda as reported above are also consistent with Grint and Woolgar’s programme of sceptical constructivism (1997, p. 143) that seeks to interrogate truth claims with the goal of understanding how it is certain views come to be accepted. For Grint and Woolgar, the truth:

[D]epends on who is describing it, although not every account is equal [...it] depends crucially on the active construction achieved by the audience (1997, p. 168).

This perspective, in keeping with those described in section 2.2.3 above guides researchers to ground interpretations of leadership to specific contextual settings and, instead of looking for a single truth or answer to the question of leadership, suggests instead that we seek to understand *why* it is that some accounts become more dominant than others.

Indeed, this is the point of sceptical constructivism,¹² which rests on the premise that:

[S]ome accounts may be more persuasive than others, but they are still accounts, not definitive, uncontested and undeniable truths that are transferred in some unmediated fashion (*ibid.*, p. 153).

Here, I lay claim to Grint and Woolgar's argument, originally applied to technology and, following Grint in subsequent work (2001, 2005a), directed it towards leadership.

Recapitulation In this section, I have discussed the meaning of leadership in terms of an ongoing cultural process of changing meaning, or *ideology* (Marx and Engels 1970, pp. 39-40; Kunda 1986, p. 54). I have shown how Gallie's ECC, Goffman's concept of *impression management*, and Grint and Woolgar's sceptical constructivist position all contribute towards an understanding of leadership as a changing, contested phenomenon open to multiple interpretations.

Sceptical constructivism is a particularly suitable philosophical position for unpacking obscured ideology from a contested definition, as it fosters interpretations that advance comprehension, not only of the ideologies that may lie behind particular views of leadership, but also to illuminate what may lie behind an ideology. Based on these arguments, I claim that the pursuit of any single definition of leadership distracts from the broader question posed by sceptical constructivism of how it is that the particular views of leadership come to be accepted as valid in particular societies, academic disciplines, and organisations. Here ideologies can be linked not only to leaders who may enact practices that align with a particular theory, but also to perspectives adopted by researchers to argue the existence of that theory within particular disciplines.

¹²According to Grint and Woolgar, the breadth of such perspectives include 'pluralism, sociotechnical alignments, ANT, constructivism, feminism, social shaping approaches, and anti-essentialism' (1997, p. 141). These are all positions I would categorise as falling into the most recent moves of social theory as depicted in table 2.2 on page 45, and thus situate sceptical constructivism as a product of modern social theory.

In the next and concluding section, I build on the work of Grint (2005a, p. 18) and Kempster et al. (2011) by combining and extending their models of leadership into a single fivefold typology that I propose for the study of leadership *in situ*.

2.2.5 A Fivefold Typology for Identifying Leadership

Grint's model as depicted in figure 2.3 addresses the contested terrain of leadership by offering a fourfold typology as a starting point to capture different ways of identifying and understanding leadership. For Grint, this pluralistic device maps existing theories of leadership.

In response to Grint's proposed typology, Kempster et al. (2011) offer an additional dimension: *purpose*. According to them:

Purpose only appears to come to the fore in situations in which leaders have set goals that project their groups to either ethical and [*sic*] moral debates. The widely celebrated and vilified examples of Gandhi and Hitler spring most readily to mind. I argue that the lack of explicit orientation towards the manifestation of purpose is not an oversight (*ibid.*, p. 318).

Thus for Kempster et al., purpose carries an explicitly ethical substrate. However, perhaps more importantly, they also claim that *purpose* has also been systematically ignored within the leadership literature.



Figure 2.4: A Synthesised Fivefold Typology Through Which Leadership Can Be Identified and Understood (adapted from Grint 2005a, p. 18; Kempster et al. 2011)

2.2.6 A Relational Perspective

Kempster et al., by placing ‘emphasis upon leadership as a process: a leader-led relational process oriented towards sensemaking’ (2011, p. 323), align themselves not only with a nascent *relational* conception of leadership (Cunliffe and Eriksen 2011; Day 2000; Drath, McCauley et al. 2008; Uhl-Bien and Ospina 2012b; Sveningsson et al. 2012), but also explicitly with a processual view (Langley, Smallman et al. 2013; Langley and Tsoukas 2010; Rescher 1996), one that by virtue of the title of their paper is also located in practice. This perspective is consistent with that of Cunliffe and Eriksen, who define relational leadership as a mode of ethical action that:

[R]equires a way of engaging with the world in which the leader holds herself/himself as always in relation with, and therefore morally accountable to others; recognises the inherently polyphonic and heteroglossic nature of life; and engages in relational dialogue (2011, p. 1425).

I find this relational perspective particularly compelling, as it closely parallels Turkle’s conception of the *evocative object* (2007) as a critical site for human relationship (1984 / Turkle 2005, p. 1) where the object is ‘a companion in life experience’ (2007, p. 5). Similar conceptualisations are offered by both Suchman (2005) and Knorr-Cetina (1997). This, in turn, links closely to my own conception of the computational object as described in section 1.2.1 and its emphasis on materiality, relationality, and a posthuman perspective that moves away from human exceptionalism. Thus, the relational perspective, in keeping with its function, not only contributes to the exploration of computational objects and leadership practices, but the *association* between them.

2.2.7 Internal Goods

Kempster et al.’s position also relies heavily on the work of MacIntyre (2004, 2007), who:

[D]raws upon the Aristotelian philosophy, specifically the notion of *telos*, contributing to the good for humankind [...] It is the relationships that MacIntyre develops between virtues, practices, goods and telos that are critical to our understanding of the establishment of a ‘good’ purpose within leadership (Kempster et al. 2011, p. 321).

MacIntyre’s work is germane to this research in that his post-virtue position in moral theory is based on the same post-enlightenment premises as Hayles’s *posthumanism*¹³ that underlies my definition of the computational object. Further, within his moral

¹³Compare, for example, MacIntyre 2007, pp. 51-78 and Hayles 1999, p. xix.

theory, MacIntyre also argues strongly for the role that identity and narrative play in structuring practice (2004, pp. 254-256), a move I observe recurs in leadership studies.¹⁴

Central to Kempster et al.'s argument is MacIntyre's proposition of *external and internal goods*, which they interpret as follows:

We can think of external goods as winning status, obtaining money, or gaining power. External goods are possessed by people—in a sense, extrinsic assets. In contrast, internal goods are a good for the whole community; examples of this would be the development of vocational skills, promoting health, preventing accidents and saving lives. Returning to the notion of *telos*, it follows that the greater the virtue (i.e. disposition) towards producing an internal good, the greater the development of practice excellence in creating internal goods. This will lead, according to MacIntyre, to a person's greater sense of fulfilment and purposeful achievement. The internal goods are valued by society and thus seen as being purposeful—good for the human race (2011, pp. 321-322).

Thus, Kempster et al. imply that MacIntyre's conceptualisation of internal goods is a useful measure by which to judge their definition of purpose. This view closely aligns with Khurana's historiographic analysis of the American business school through a:

[S]ustained quest for social and moral legitimacy—finally achieved through the linkage of management and managerial authority to existing institutions viewed as dedicated to the common good—that management successfully defined its image as a trustworthy steward of the economic resources represented by the large, publicly held corporation (2007 / 2010, p. 3).

Khurana continues, noting the receding nature such a moral perspective on management has taken up through the present day:

Once management had successfully pursued its claims to legitimacy and control over corporations, the awareness that this was neither inevitable nor inherent in the nature of things began to vanish—although it has flickered at the edges of America's collective consciousness at moments of crisis such as the Depression (when business leaders were implicated by many in the stock market crash), the economic crisis of the 1970s (when shareholders began to

¹⁴For research that links leadership and identity, see DeRue and Ashford 2010; Hogg and Knippenberg 2003; Ibarra et al. 2010; Lord and Hall 2005; Mintzberg 1975; Nicholson and Carroll 2013; Reicher et al. 2005; Sveningsson et al. 2012; Van Knippenberg, Knippenberg et al. 2004. For research linking narratives and leadership, see Boal and Schultz 2007; Gertz 2011; Maclean et al. 2012; Tierney 1996; Weischer et al. 2013.

rise up against managers held responsible for inadequate corporate performance), and most recently, the spate of business scandals of the early years of the twenty-first century (2007 / 2010, p. 4).

Such ethical concerns are crucial at a time when enhancing the capacities of leadership is seen as pivotal to satisfying increasing ‘demands for leadership insights’ and restoring trust in institutions (Nohria and Khurana 2010, p. 5).

2.2.8 Summary of Grint and Kempster et al.’s Contribution

Together, what Grint (2005a) and Kempster et al. (2011) suggest is that leadership can be understood in five ways: *person*, *result*, *position*, *process*, and *purpose*. This typology is rendered as figure 2.4. Through this framework, it is possible to identify dimensions through which leadership is materialised, often involving overlap of these dimensions I refer to as *intensifiers*. I employ this theoretical typology as a crucial element in my research ‘toolkit’ (Nicolini 2012, p. 213). My theoretical perspective thus extends the work of Grint (2005a) and Kempster et al. (2011) and takes leadership as a citational phenomenon (1993 / Butler 2011, pp. xxi-xxiv; Derrida 1977, p. 18). Here, I suggest that leadership, rather than an observable phenomena *per se*, is instead a *signifier*, ascribed both processually and performatively (Grint 2010a, p. 11). For these reasons, this is also a perspective that locates leadership in *practice*.

In my extension of their work, the thesis I wish to take forward is that leadership is not simply *understood* in certain ways, but that *practices* are understood as leadership precisely because they are cited as such. I will argue that leadership, following Ailon and Kunda, acts as a ‘symbolic resource’ (2003), standing for particular values within the context of a community such as an organisation.¹⁵ Thus, I argue that leadership always stands for something else for which the word ‘leadership’ acts a proxy or container. I insist that leadership points to an underlying process of categorisation (Bowker and Star 1999; Zuckerman 1999) of value and worth (Boltanski and Thévenot 2006), which a practice theory (PT)-based approach (Nicolini 2012; Reckwitz 2002; Szymanski and Whalen 2011a) helps to reveal.

2.2.9 Applying the Fivefold Typology

To exemplify the application of the proposed framework, I will demonstrate, in what is to follow, how one might go about extending the fivefold typology I have synthesised from the work of Grint (2005a) and Kempster et al. (2011) to include computational objects.

¹⁵In their study, Ailon and Kunda analyse ‘national identity’ (2003) as a symbolic resource.

This exercise draws discursively on what a leader might accomplish, where she operates, how she gets things done, and what might be discerned about her motivations. I will also suggest that when there is a superabundance of material-discursive evidence across these five dimensions of leadership that there also arises an *intensification* of the iterative citationality (1993 / Butler 2011, pp. xxi-xxiv; Derrida 1977, p. 18) of leadership as citations from across various dimensions accumulate.¹⁶

Thus, I will argue that any of the five dimensions *may* be mobilised in a citation of leadership and moreover, when multiple dimensions are mobilised, I suggest this intensifies the citation, further substantiating the phenomenon. However, before I proceed with this example, I will address a critical concern regarding this approach in terms of ‘where’ this citational approach places ‘leadership’.

2.2.9.1 Quo Leadership?

To those who would ask of this citational approach by stating ‘Where is leadership?’, I answer, following Densten, that leadership is:

[A]n abstract concept invented by people trying to understand their experiences and identity. While leaders, followers, and situations are indeed observable, leadership itself has no physical form and is constructed in the minds of observers (2008, pp. 93-94).

However, I would amend Densten’s conception slightly. Rather than locating it in someone’s mind, I suggest that the concept called leadership is located in material-discursive practices of symbolic citation. Following recent studies that look to discursive- (cf. Bolden and Gosling 2006; Kuronen and Virtaharju 2015; Larsson and Lundholm 2013; Larsson and Lundholm 2010; Vine et al. 2008; Wodak et al. 2011) and practice theory (PT)-based empirics (cf. Endrissat and Arx 2013; Fletcher 2012; Raelin 2011; Styhre 2012) to locate leadership, I concur with Alvesson and Sveningsson, who argue that:

[L]eadership discourse [makes] managers invest a strong symbolic, even magical, meaning in mundane acts and talk (2003b, p. 1457).

Furthermore, these approaches are felicitous towards an analysis of identity and the use of narrative in the constitution of leadership, which forms an established basis for enquiry (cf. Cunliffe and Coupland 2012; Korica and Molloy 2010; Stein et al. 2013).

¹⁶Here, I acknowledge Barad’s (2007, p. 151) critique of Butler’s use of ‘iterative citationality’ based on what Barad describes as a lack of attention the material aspects through which difference is created (*ibid.*). Instead of ‘iterative citationality’, Barad prefers ‘iterative intra-activity’ as a way to show that citations are not static, fixed properties, but that they too are changed by their very usage (*ibid.*). In my usage of ‘citationality’, I acknowledge the linked material-discursive aspects involved and see no conflict with Barad that citations are made through material-discursive practice.

For such a position, the fivefold typology I have presented is a useful framework enabling a deconstructive analysis that can explain how the symbolic citation of leadership arises in a situationally embedded context (Emirbayer and Mische 1998, pp. 969-970; Suchman 1987, p. 118). Such an analysis can shed light on how leadership was attributed, but more importantly, help answer such questions as ‘What kinds of leadership might we like to establish in future?’

Unfortunately, in their original formulations, neither Grint nor Kempster et al. specifically address computational objects within their typologies. To address this shortcoming, I present below a brief sketch of how I propose to further extend these dimensions to include computational objects.

2.2.9.2 Person

To speak of someone or to think of one’s self is to refer to identity, which is based on the activity of perception (Bamberg 2011). Identity is thus enabled through the apprehension of experience and knowledge. Yet inversely, skills are often attributed to identity (Borgmann 1987, p. 41). For example, when it is said of a leader that she is ‘good with people’, this suggests that the leader has certain fluency around social relations.

Engagements with computational objects also require experience and knowledge, and furthermore, these have the potential to shape and influence behaviour (Fogg 2009a,b), augment intellectual capacity (Engelbart 1962; Tversky 2003; Sparrow et al. 2011), and, completing a critical feedback loop (Wiener 1961, pp. 96-97), forge new identities (Poster 2006; Turkle 2004a,b). Following Turkle, leaders facile with computational objects may therefore be able to project different kinds of presence than those who are not (1984 / 2005, p. 5, *passim*).

As above, this relation also flows inversely. Leaders who enjoy a fluency with computational objects may also be able to perceive aspects within their organisations not available to them via other means. For example, through a computational object, a leader may be able to check the status of various subordinates or projects, enabling said leader to leverage this representation/information to guide prioritisation of face-to-face conversations. This may lead to a citation of leadership based on a perception of the formal leader as being ‘on top of things’.

I therefore suggest that the relationships leaders form with computational objects shape (perceptions of) identity in ways that can lead to attributions of leadership. Given the rise and ubiquity of the computational object within the corporation (Chandler et al. 2005; Jordan 2012, pp. 39-40), and the degree to which contemporary life is enmeshed with (computational) technology (Borgmann 1987, p. 235; Grint and Woolgar 1997, p. 1; Knorr Cetina 1997, p. 7), I posit that the relationship between human and computational object,

particularly in globalised organisations (where arguably richer infrastructures exist), may be a fulcrum for such citations.

2.2.9.3 Result

In this dimension, the focus is on outcomes. Take, for example, the figure of Steve Jobs, named recently by the *Harvard Business Review* as the all-time top-performing CEO, based on the financial return generated by Apple Computer (Hansen et al. 2013). Thus the particular citation of leadership, as evidenced by Mr Jobs's position on a particular list, can also be viewed as an citation of leadership made through the dimension of *result*.

An additional observation here is that results are increasingly related to computational objects. For example, a recent profile of Cisco's CEO credits him for establishing an environment where:

Cisco citizens are blogging, vlogging, and virtualizing, using social-networking tools that they've made themselves and that, in many cases, far exceed the capabilities of the commercially available wikis, YouTubes, and Facebooks created by the kids up the road in Palo Alto (McGirt 2008).

Here, results are couched in terms of what Cisco employees have accomplished *through* computational objects. Their results are employed to retroactively attribute leadership by the author to the CEO.

Furthermore, such results are often accomplished through pragmatic, everyday practices, enacted through computational objects. To the extent that humans within organisations look to a computational object in order to know what to do next, I argue that the computational object is granted and plays the role of leader, reinforcing the various agential questions of humans, technology, and materiality, as raised in section 2.3.7.¹⁷

2.2.9.4 Position

Grint refers to this as the dimension of *spatial* position within an organisation, normally associated with a vertical structure of hierarchy, power, or authority (2005a, p. 28). However, it can also be associated with a horizontal structure as well. Grint refers to this as 'Leadership-in-Front' (*ibid.*) where the leader, such as Steve Jobs, is viewed as a trendsetter.

In applying this dimension to computational objects, I turn to the work of Kahai (2012), who has argued that in the context of leadership, a number of factors emerging from computational objects should be considered. These include the rapid dissemination

¹⁷See in particular footnotes 22, 23, and 24 on page 54.

of information, manipulation of communication, and the ability to overcome geographical separation (2012, p. 75). Here, position may not be physically spatial in the traditional sense, but I contend that leaders who employ computational objects as a part of their leadership practice may be able to position themselves, and thus attract citations of leadership, in ways that cannot be achieved without these artefacts.

2.2.9.5 Process

In this dimension, Grint asserts that:

[T]he process approach to leadership is more concerned with how leadership works—the practices through which they lead—their rhetorical skill that entrances the followers, or their inducing of obedience through coercion or whatever happens to work (2005a, p. 28).

Here leadership is explicitly associated with practice, which can be (re)articulated through engagements with computational objects (Iacono and Kling 2001). Thus, I submit that through relations with computational objects, leadership practices are altered, sometimes with important new meanings and implications of agency.

2.2.9.6 Purpose

In this dimension, leadership is bound to a moral disposition. A close reading of Kempster et al. reveals that the dimension of purpose can be observed as part of a research program of ‘qualitative understanding of managers’ perceptions of purpose’ (2011, p. 330) through research questions such as the following:

1. ‘How widely do such social purposes, as defined by the production of internal goods, permeate and infuse everyday leadership discourse?’
2. ‘Although company survival (which is an external good) is arguably a “worthy purpose”, how central is it to a good human life?’
3. ‘Can leaders in organizational contexts, through processes of sense-giving, generate sustainable virtues that deliver internal goods alongside external goods and thus help followers explore their *telos*?’ (*ibid.*, pp. 325-326)

The first question suggests that a focus on MacIntyre’s internal goods by drawing on discursive evidence is one manner in which to identify purpose. The second question asks the researcher to explore the relationship that external good production plays with respect to the production of internal goods in a discursive practice. And finally, the third

question asks the reader to look at the practice of leaders (and their followers) that may be bound up with the generation of virtues and delivery of internal goods.

Here, I look to the discursive practice of Apple Computer and its recent claims through its ‘Our Signature’ ad campaign to make ‘life better’ (Apple Computer, Inc. 2013) through the design and the subsequent use of its computational objects. An example of one such advertisement is rendered below as figure 2.5; for full text of the ad, see Appendix C on page 222.

Within this text, such poetic lines as ‘Until every idea we touch enhances each life it touches’ employ the rhetorical figure of *Antimetabole* (McQuarrie and Mick 1996, p. 430) to lay claims regarding Apple’s commitment to a positive contribution to society as an internal good. But in such claims, impacts incurred through the manufacture and sales of their products that may harm society are obscured (cf. Chan and Pun 2010; Litzinger 2013).

The words of Boorstin are particularly appropriate here:

When ‘truth’ has been displaced by ‘believability’ as the test of the statements which dominate our lives, advertisers’ ingenuity is devoted less to discovering facts than to inventing statements which can be made to seem true (1961 / 1992, p. 226).

Thus, in seeking to understand *purpose* in relation to engagements with computational objects, options include the exploration of outcomes such as social isolation (Hampton et al. 2009; Turkle 2011), the effects of increased surveillance (Jensen and Draffan 2004), or reduced attention (Jin and Dabbish 2009, p. 1799; Shellenbarger 2013). Further this dimension suggests that I focus on engagements where leaders and their followers show some attention to, or regard for, internal goods through their engagements with computational objects through some of the themes outlined above. For comparison, I may also focus on the inverse: situations where no apparent attention is given to internal goods.

2.2.9.7 Recapitulation

In this section, I have attempted to adumbrate, based on the work of Grint (2005a, p. 18) and Kempster et al. (2011), a theoretical extension to a pluralistic, fivefold typology of leadership that includes computational objects in the analysis of leadership practices. I have suggested that there are ways to interrogate each dimension as a relation between human and computational object. In this fashion, I hope to have shown there is a theoretical grounding for the perspective I am developing, one where computational objects are recognised as an essential component of leadership practice and where leadership practices can be accurately identified in my observations.



Figure 2.5: Print Advertisement from Apple’s Recent ‘Our Signature’ Campaign (Apple Computer, Inc. 2013) (For the full text of the ad, see Appendix C on page 222.)

Here, I align closely with Kahai, who has argued that:

[L]eadership in this new context demands new understanding and new skills in addition to old understanding and skills. Most organizational leaders have yet to understand what this new context is and what it means for leadership (2012, p. 63).

Thus, a primary aim of my research is to articulate through ethnographic enquiry what Kahai’s ‘new context’ might mean for leadership in the environments where it occurs.

In the next section, I engage with a larger question of the relation between the theorising that takes place within leadership studies and the social sciences in general.

2.3 The Arc of Social Theory

In considering the overall arc in the development of leadership theories within the extant literature, many scholars have attempted to tell this story; one such perspective is rendered

by Van Setters and Field (1990) in figure 2.6, along the lines of a genealogical family tree.

One could also tell the story of this progression in a flatter, more linear fashion by saying that it begins with leadership theories based on an undifferentiated quality of leadership, evidenced for example by Weber's 'supernatural gifts' (1921 / 1946, p. 245). As outlined in section 2.2, from here we see a shift to trait theories of leadership that posit specific internal characteristics of individuals. After this period of theorisation there appeared an ever-increasing number of factors, such as behaviours and the assumptions behind them (suggesting a rudimentary reflexivity), contingency theories that add context, and other theories that followed, such as the inclusion of followers, teams, roles, networks, distribution, and identity as sites of leadership.

With respect to this theoretical development, my thesis is that leadership studies have followed the progression or evolution of social theory and draw upon the styles or paradigms (1962 / Kuhn 2012) of theorising that first arise within broader social theory. I refer to this progression as the *arc* of social theory throughout this work. I begin by analysing this arc; by considering the overall theoretical movement of the social sciences from their inception, it is possible to track a progression here as well. A motivating factor for this approach is Lee's assertion that:

One would suppose that people who hold the degree of doctor of philosophy would be familiar with philosophy and receptive to its perspectives (2004, p. 1).

This provocation suggests that one in my position vying for such a degree should make it their business to explore the philosophical underpinnings of their study. As a researcher exploring the social world, such an exploration of the arc of social theory is, according to Lee, highly desirable.

The position I will take is that the progression of the social sciences centres around a changing relationship between subject and object (Daston and Galison 2007, p. 10). Under this view, each major period in the development of social scientific theory asserts a particular ideological stance on what that relationship *should* be in order to generate authentic scientific knowledge. Daston and Galison summarise these in their panoramic study of objectivity as a story of ongoing 'reconfiguration' (*ibid.*) that can be summarised in five moves, as shown in table 2.2. In fact, Daston observes the concept of objectivity is multifaceted, referring:

[A]t once to metaphysics, to methods, and to morals. We slide effortlessly from statements about the "objective truth" of a scientific claim, to those about the "objective procedures" that guarantee a finding, to those about the "objective manner" that qualifies a researcher (1992, p. 597).

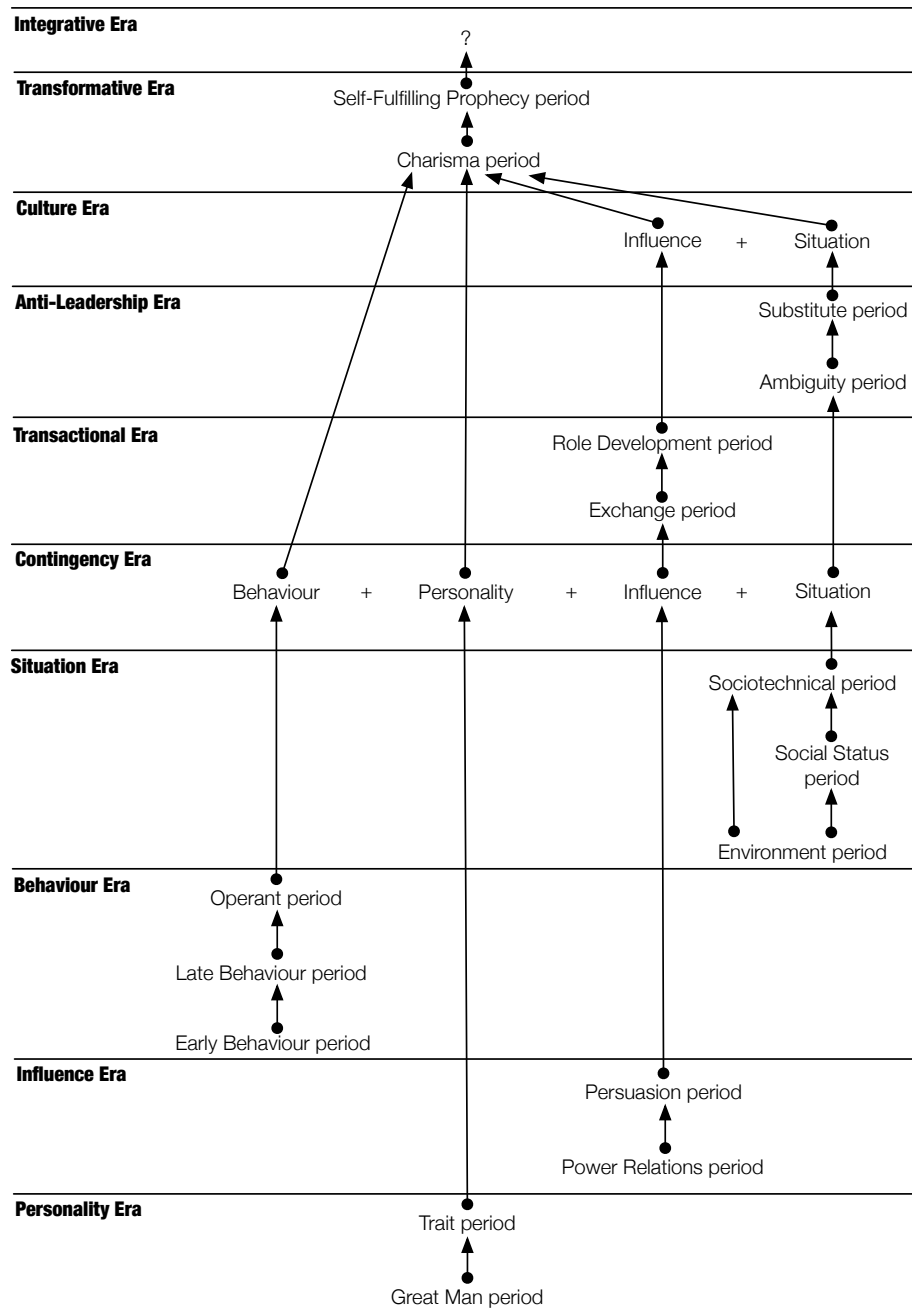


Figure 2.6: Evolution of Leadership Theory: 1869–1985 (adapted from Van Seters and Field 1990, p. 33)

In their later work, Daston and Galison argue for a history of objectivity as a ‘subset, albeit an important one, of the much longer and larger history of epistemology’ (2007, p. 31). Their aim is to decouple objectivity from its conflation with science and to show that it is but one segment of a much larger arc of the ‘philosophical examination of obstacles to knowledge’ (*ibid.*, p. 32). Here, they argue that it is not the case that all philosophical determinations of error are a result of objectivity. In a move kindred to Gödel and his incompleteness theorem (1931), they claim there exist errors (and solutions) outside the system we refer to as objectivity.

In what follows, I will discuss these five moves, their significance, and the social theories that map their relational character. I will argue that the progression of leadership theories lags behind the general movement of social theory, reflecting an ongoing redefinition of the relationship between subject and object. Further, rather than each phase being distinct such that as one ends another begins, there is instead what a variety of commentators describe as *pluralism* (cf. Fuller and Collier 2004; James 1909; Rescher 1995; Shipilov et al. 2014; Turkle and Papert 1992), where many theories exist simultaneously and are employed by different people in different contexts for different purposes. Thus, when a new theory emerges and is legitimated, the previous position is not necessarily abandoned by all.¹⁸ Rather, what emerges is a plurality of positions where many are argued simultaneously (Torfing 1999, p. 10). This idea of *pluralism*, in its recognition of multiple viewpoints, helps to elaborate the terrain on which sceptical constructivism (Grint and Woolgar 1997, p. 143) rests, where the concern is how particular views come to be seen as ‘the truth’. A *pluralist* perspective also reminds us that views may continually and existentially compete with no dominant outcomes.

2.3.1 The Unreliable Subject

Comte’s positivism (1865) was first and foremost a *sociological* project, claiming that knowledge regarding social research could be properly obtained by employing specific empirical methods. Positivism centres on the notion of objectivity, or more generally, the notion of a subject who stands in relation to an object of study in a particular fashion. Positivism questions the reliability of the subject and, like the initial ‘great man’/trait views of leadership (cf. Bowden 1926; 1883 / Durkheim 1973, p. 25; 1921 / Weber 1946, p. 245), proceeded from this perspective. Yet, as critics of this view have argued, arranging the subject to the

¹⁸One possible reason for this is that theoretical positions may function as systems of control, where new systems are additive rather than substitutive (Kunda 2006, p. 220). How might social theories act as systems of control? First, they specify to followers of the theory how they should think about reality. Second, to researchers who ascribe to a theoretical perspective, these often imply specific and normative methodological steps, such as those involved with establishing construct validity using statistical methods when conducting research under a positivist theoretical perspective (Bryman 1989, p. 45).

Move	Period	Theories and Theorists	Assumptions
The unreliable subject	from 1850	<ul style="list-style-type: none"> • Positivism • Comte (1865) • Durkheim (1893 / 1964; 1897 / 1989) 	<ul style="list-style-type: none"> • Ontology: The social world is independent of the individual knower • Epistemology: The social world can be known empirically • Methodology: Proper techniques and rational definitions provide veritable access to social life
Redefine the object	from 1900	<ul style="list-style-type: none"> • Phenomenology, methodological antipositivism, hermeneutics, interpretivism • Husserl (1900 / 2001b; 1900 / 2001a) • Weber (1904 / 1930) • Mead (1934 / 1972) • Goffman (1956) • Gadamer (1960 / 2004) 	<ul style="list-style-type: none"> • Ontology: The salient feature of the social world is social action, constituted through values and meaning • Epistemology: The values and meanings shaping social action are knowable • Methodology: Grasping the relation between understandings, values and actions through hermeneutics, observation, ethnography, and interviews
Keep the subject at bay	from the mid-1930s	<ul style="list-style-type: none"> • Critical theory, structuralism • Benjamin (1936 / 1968) • Horkheimer and Adorno (1944 / 2002) • Arendt (1951 / 2004; 1958 / 1988) • Barthes (1957 / 1972) • Lévi-Strauss (1958/ 1968) • Habermas (1962/ 1991) • Giddens (1971) 	<ul style="list-style-type: none"> • Ontology: The social world is relational and constituted through social relations and structures • Epistemology: The social relations and structures shaping social action are knowable • Methodology: Grasping the relation between everyday life and the relational structures that shape it through critique and depth-surface investigation
Contextualising the subject	from the mid-1960s	<ul style="list-style-type: none"> • Poststructuralism, postmodernism, feminist, and queer theory • Lacan (1966 / 2001) • Derrida (1967 / 1976) • Foucault (1969 / 2002) • Lyotard (1984) • Haraway (1988) • Butler (1990) 	<ul style="list-style-type: none"> • Ontology: The self is discursively produced and the world is not knowable as a totality • Epistemology: Knowledge is situated and relative • Methodology: Grasping the discursive relations that constitute the subject through genealogical analysis, standpointism, social construction, and narrative
Unify (or remove) subject and object	from the mid-1980s	<ul style="list-style-type: none"> • Actor-network theory, agential realism, onticology • Callon and Latour (1981) • Chia (1995) • Barad (2007) • Harman (2011) 	<ul style="list-style-type: none"> • Ontology: Reality is locally materialised, relational, and performative • Epistemology: The world is dynamically produced through shifting networks and alliances of objects, both human and non-human • Methodology: Follow the actant and trace the network

Table 2.2: The Arc of Social Theory in Five Moves (based on Daston and Galison 2007 and further informed by conversations and lecture materials from former University of Warwick professor Bob Carter)

object in a particular fashion does not remove the subject or provide it with a guaranteed and ultimate view of reality (Derrida 1976, pp. 10-18; Haraway 1988; Harding 1991).

2.3.2 Redefining the Object

Another view of the relationship between subject and object can be found in the interpretivist/hermeneutic/phenomenological traditions that followed positivism. These approaches emphasise both meaning and subjectivity as the defining features of the social world and therefore seek to understand relationships between values and actions. By doing so, they redefine the object of study. This is analogous to the moves in leadership theories of behavioural theories (cf. Blake and Mouton 1964; Fleishman 1953; McGregor 1985) that reinterpret leadership based on qualities or values held by the leader.

2.3.3 Keeping the Subject at Bay

Following this move, there arose the critical and structuralist schools of social theory. Both are influenced by Marx (1867 / 1976). The former attempts to question dominant understandings through the method of critique, while the latter enquires into the social relations, or structures that are seen to be responsible for social outcomes. Marx's historical materialism takes this view by positing that social outcomes are a result of economic structure. This approach to scientific study keeps the subject at bay by placing emphasis on social relations and structures. Contingency theories of leadership (cf. Fiedler 1963; House 1971; Vroom and Yetton 1973) apply a similar logic.

2.3.4 Contextualising the Subject

The social theories of poststructuralism¹⁹ and postmodernism question the possibility of knowing altogether, asserting that the world cannot be known *in toto* and that knowledge is both situated and partial (Haraway 1988; Harding 1991; Kirby 2011; Suchman 1987). This view contextualises the subject, asserting that the subject is situationally produced. Social constructionism (Berger and Luckmann 1966) and the work of Foucault around power and ethics (1972-1977 / 1980) exemplify this approach. Leadership theories that explore concepts such as leader-role construction and an emphasis on ethics reflect similar concerns (cf. Burns 1978; Dienesch and Liden 1986; Graen et al. 1982; Greenleaf 1973).

¹⁹With respect to my use of the term *poststructuralism*, Barad cautions against a conflation of *poststructuralism* and *postmodernism*. For Barad, the former relates to 'radical critique of individualist ontologies, especially as found in the notion of the liberal human subject' (2007, p. 410), whereas the latter is 'concerned with a critique of modernism' (*ibid.*). In this sense, *posthumanism* (Braidotti 2013; Halberstam and Livingston 1995; Hayles 1999; Wolfe 2010), is therefore a poststructuralist project, one with which the present study is closely aligned.

2.3.5 Unifying Subject and Object

The most recent move attempts to unify subject and object, asserting that all such relationships between them are in relation to a materiality that is empirically observable. These theories stress processual, relational, and performative dimensions. Under such a view, observers or subjects are also themselves material objects. Such theories also question the very notion of a distinct subject and object. For example, Miller attempts to erase their distinctive significance altogether when he refers to subjects and objects processually as:

[A]pppearances that we see emerging in the wake of the process of objectification as it proceeds as a historical process (2005, p. 10).

A number of influential processual perspectives (cf. Langley, Smallman et al. 2013; Langley and Tsoukas 2010; Rescher 1996) fall under this movement in social theory. Under this ontological perspective:

[E]ntities (such as organizations and structures) are no more than temporary instantiations of ongoing processes, continually in a state of becoming (Tsoukas & Chia quoted in Langley, Smallman et al. 2013, p. 5).

Thus, within a processual perspective, subjects and objects are unified in a perpetual state of ongoing ‘becoming’ and are merely ‘temporary instantiations’ as that process progresses.

Latour’s actor-network theory (ANT) is processual, relational, and performative. For example, in a central tenet it asserts that the use of the word ‘social’ is often misused to attribute an explanatory quality to the object it is being used to describe when, according to Latour, the word actually denotes ‘a movement during a process of assembling’ (2005, p. 12) that can only be revealed by tracing its relations. Karen Barad’s agential realism (1997, 2003, 2007) also falls into this category, as does Graham Harman’s object-oriented philosophical perspective (2011), both of which assert that reality arises through the interaction of objects.²⁰ All of these theories are also said to be *posthuman* (Braidotti 2013; Halberstam and Livingston 1995; Hayles 1999; Wolfe 2010) in that they claim to no longer uphold the traditional position of the human as being the zenith of all knowing and being. They attempt, instead, to explore how the human, *among other objects*, shares a place in reality. Such approaches, according to Plotinsky, represent:

²⁰In Barad’s case, in order to stress the entanglements and agential shifts that arise through interaction for which she argues, she deploys the term *intra-action* to signify ‘the mutual constitution of entangled agencies’ (2007, p. 33).

[T]he most radical theories to date—the theories transforming most radically the spectrum of theoretical possibilities available to us, both in their critical or deconstructive and constructive or theory-building potential (1994, p. 2).

In leadership theory, the move to notions of adaptive leadership (cf. Heifetz et al. 2009a; Useem 2010b; Yukl and Mahsud 2010), distributed leadership (cf. Bolden 2011; Gronn 2002; Spillane 2006), and to a lesser extent, identity-based leadership (cf. Ford 2006; Hogg and Knippenberg 2003; Ladkin 2013; Sveningsson et al. 2012; Van Knippenberg and Hogg 2003) all share a similar processual, relational, and performative perspective. Research is mounting in this direction, as evidenced by an recent special issue of the journal *Leadership* exploring ‘the materiality of leadership’ (Pullen and Vachhani 2013) and the present study, which explores material entanglements of leadership practice and computational objects.

2.3.6 Comparing the Moves in Social Theory and Leadership

Palmer and Hardy (2000, p. 231) have produced an analysis of the various schools of leadership. As with the arc of social theory (see table 2.2), they present their analysis in five moves. An overview of their classification of leadership theories is presented in figure 2.7.

In contrast to Van Seters and Field’s (1990) genealogical analysis as depicted in figure 2.6, Palmer and Hardy presents a linear and flattened view of the study of leadership. I have summarised the details of Palmer and Hardy’s analysis in table 2.3, which includes the assumptions of each classification and its main criticisms.

Against the background of Palmer and Hardy’s analysis, I suggest that the trait theories, like the first move in the social sciences, places a special quality within the subject. In the former case, it is the power to lead, while in the latter, it is the power to know under ‘objective’ conditions. Similarly, style theories add on qualities to the original model in a parallel fashion to the second move in social science theory to redefine the object. Following these, contingency theories of leadership, which begin to take the environment into account, follow the queue of structuralism by looking to the environment as a force that structures leadership over and above the individual. Then, in the next phase there are the transactional and transformational theories, which, according to Van Seters and Field, suggest that leadership is located:

[N]ot only in the person or the situation, but also and rather more in role differentiation and social interaction (*ibid.*, p. 35).

In other words, transactional and transformational theories of leadership emphasise the discursive production of leadership, one that is both situated and relative, corresponding with the fourth move in social science theory, contextualising the subject.

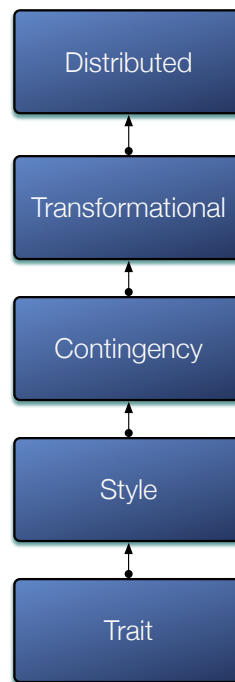


Figure 2.7: A Linear View of the Progression of Leadership Theory (adapted from Palmer and Hardy 2000, p. 231)

Finally, the distributed theories of leadership follow the same dictum that the fifth move in social science theory takes; namely to blur the distinction between subject and object by asserting that leadership flows across such ‘boundaries’.

Chronologically, by then comparing the corresponding moves in social theory and leadership, what becomes apparent is that there is a time lag where, first, styles of social theorising become established and following this, leadership scholars appear to mobilise the previous move in their work. I have rendered such a comparison in table 2.4. It shows that in the first move the time lag is approximately 50 years, that it subsequently decreases 10 years for each subsequent move, arriving at a lag of approximately 10 years for the fifth.

Thus, my analysis reveals a trend of a closing time lag between the generation of styles of social theorising and leadership theories that employ those styles. This lag is perhaps a consequence of the constellation of technologies around printing, publishing, and writing (McLuhan 1962) that, 50 years ago, were primarily print/paper based, but have now shifted to digital media and layered modular architectures (Yoo, Henfridsson et al. 2010, p. 724), which, together, enable increased transmission and dissemination of such material (Coyne 1995, p. 1).

Yet, while the analysis shows that the gap is closing and may already be at a stage

School	Period	Assumptions	Criticisms
Trait	Up to 1940s	<ul style="list-style-type: none"> Leaders have physical traits, individual abilities and personality characteristics which distinguish them from non-leaders 	<ul style="list-style-type: none"> Inconsistent evidence concerning importance of cited traits
Style	1940s to 1960s	<ul style="list-style-type: none"> Shift from focus on traits to behaviours Emphasis on training of leaders rather than on the selection of leaders Two behaviour styles: <i>consideration</i> for subordinates leads to high morale, but lower performance; <i>initiating style</i> tells subordinates what to do and how to do it leads to poor morale, but higher performance Later studies argue that better leaders were high on both styles 	<ul style="list-style-type: none"> Inconsistent results Lack of attention to impact of situation on leadership effectiveness Difficult to establish causal interpretations Overly focused on formal leaders rather than informal leadership processes Problems of measurement
Contingency	Late 1960s to early 1980s	<ul style="list-style-type: none"> Situational factors affect leadership effectiveness Leadership attributes are related to personality Therefore, to increase leadership effectiveness, the work situation must change to fit the leader rather than the reverse 	<ul style="list-style-type: none"> Writers unconvinced about measurement of leadership using 'least preferred co-worker' (LPC) scale Dispute about validity of measuring 'situation' Exclusion of informal leadership processes
Transactional and Transformational	1980s+	<ul style="list-style-type: none"> Leaders as managers of meaning – leaders as transformational, charismatic, and visionary 	<ul style="list-style-type: none"> Excessive focus on top leaders; overemphasis on successful leaders Little focus on informal leadership processes Little attention paid to situational factors Problems of assumed causality
Distributed Leadership	1990s+	<ul style="list-style-type: none"> Leadership neither 'heroic' nor the domain of formally designated leaders but a widely dispersed activity Nurture leadership capacity in others Distribution of leadership as a relational process throughout teams Recognition of non-traditional leadership skills, e.g., organising, networking 	<ul style="list-style-type: none"> Question of whether distributed leadership—and its implications of responsibility and empowerment—is a political technique for achieving greater employee control/output

Table 2.3: Leadership Theories: Past and Present (adapted from Palmer and Hardy 2000, p. 231)

Move	Social Science	Leadership	Time Lag
First	Up to 1900	Up to 1940s	Appx. 50 years
Second	Up to the mid-1930s	1940s to 1960s	Appx. 40 years
Third	Up to the mid-1960s	Late 1960s to early 1980s	Appx. 30 years
Fourth	Up to the mid-1980s	1980s+	Appx. 20 years
Fifth	Mid-1980s and onwards	1990s+	Appx. 10 years

Table 2.4: Chronological Comparison of the Five Moves in Social Science and Leadership

where theoretical development in both social theory and leadership appears to occur in-step; even in this case, I argue that leadership theorists as specialists within the social sciences will continue to draw on broader disciplines such as the social sciences and philosophy to inform their work, just as I am doing here.

2.3.7 An Invitation to Theorise

If it is the case that the development of leadership theory follows social theory, then it would be prudent for this investigation to take up with the more recent developments within social theory as a starting place for the generation of novel and richer leadership theorisation. To this end, I will be mobilising social theories emerging in the fifth move, including aspects of Latour’s actor-network theory (ANT) (2005) and Barad’s agential realism (1997, 2003, 2007). Moreover, to address the aspect of how humans relate to technology, I will mobilise Ihde’s conceptualisation of human-technology relations (1990). At this suggestion of combining various aspects of different theories, I point the reader to Law’s acute observation that ANT is a banner around which a number of scholars gather but also the site of a diaspora where:

It has spread, and as it has spread it has translated itself into something new, indeed into many things that are new and different from one another. It has converted itself into a range of different practices which (for this is the point of talking of translation) have also absorbed and reflected other points of origin: from cultural studies; social geography; organizational analysis; feminist STS. So actor-network theory is diasporic. Its parts are different from one another. But they are also (here is the point) *partially connected*. And this, of course, is another way of talking of the problem of naming, the problem of trying to discern or impose the ‘ANT’-ness of ANT. Or, indeed, any of the single-line versions of actor-network theory, the ‘have theory, will travels’ which have proliferated.

The point, then, is both practical and theoretical. For these attempts to convert actor-network theory into a fixed point, a specific series of claims, of rules, a creed, or a territory with fixed attributes also strain to turn it into a single location. Into a strongpoint, a fortress, which has achieved the double satisfactions of clarity and self-identity. But all of this is a nonsense for, to the extent that it is actually alive, to the extent that it does work, to the extent to which it is inserted in intellectual practice, this thing we call actor-network theory also transforms itself. This means that there is no *credo*. Only dead theories and dead practices celebrate their self-identity. Only dead theories and dead practices hang on to their names, insist upon their perfect reproduction. Only dead theories and dead practices seek to reflect, in every detail, the practices which came before (*italics in original*, 1999, p. 10).

In this, Law describes a continuum between theoretical positions that are ‘dead’ and those that are vitally ‘alive’, those which seek to defend themselves from change and those which embrace it, those which seek strict definition and those which allow broad and ongoing interpretation. He argues for the latter, the inclusive, the plural, the processual, and the dynamic. Moreover, in publishing the edited volume *Actor Network Theory and After* (Law and Hassard 1999), he and his co-authors, including Callon, Latour, Mol, Strathern, and others explicitly invite the reader to take theory forward, to alter it in useful ways, and to allow the theoretical perspective to grow and develop. This is an invitation I accept and, I would suggest, is a necessary one in the furtherance of knowledge. Thus, I pick out and in some cases combine different aspects of ANT and agential realism into a toolkit (Nicolini 2012, p. 213) guided by the specificity of my enquiry into the relationship between leadership practices and computational objects. Perhaps the best way to explain this is to briefly sketch each of these theoretical terrains as I have read them, pointing out the aspects of these perspectives I believe will be helpful to the present study.

In the next three sections I therefore present necessarily simplified forms of these theoretical positions in order to highlight the conceptual elements I intend to operationalise in this study. This is followed by a short section introducing Ihde’s ideas of human-technology relations (1990) that will be mobilised later to theorise about the roles computational objects play with respect to leadership practice.

2.3.7.1 Actor-Network Theory

Blok describes ANT as a ‘collective’ set of perspectives that attempt to move beyond the traditional ‘divides’ in social theory: ‘agency/structure, micro/macro, subject/object, culture/nature’ (2013, p. 9). In this stance, ANT is an anti-essentialist project, denying *a priori*

properties to relations between knowledge and artefacts. Law explains that ANT accomplishes this by treating:

[E]verything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located. It assumes that nothing has reality or form outside the enactment of those relations. Its studies explore and characterize the webs and the practices that carry them. Like other material-semiotic approaches, the actor network approach thus describes the enactment of materially and discursively heterogeneous relations that produce and reshuffle all kinds of actors including objects, subjects, human beings, machines, animals, ‘nature’, ideas, organizations, inequalities, scale and sizes, and geographical arrangements (2009, p. 142).

These ends can in fact be advanced in a number of ways, from Callon and Latour’s unpacking of *black boxes* (1981, p. 285), to Law’s *material semiotics* (2009, p. 142), through Mol’s *ontological politics* (1999, p. 74). However, it is also crucial to recognise that ANT is a *posthuman* approach in that it seeks to replace humanism and its anthropocentricity with what is described as *heterogeneity* (Callon 1986b, p. 28; Latour 2010b, p. 474; Law 1991, p. 3). That is to say that ANT seeks to ‘return locutions of “the social” to their wider planetary and cultural contexts’ (Munro 2009, p. 125). Below I outline the following successive conceptual ideas from ANT that I believe add value to this study’s theoretical base:

- Symmetry
- Translation
- Circulation of Reference

Symmetry One of the central arguments of ANT is that any distinction between ‘the social’ and that which is material (‘the world’) is arbitrary and therefore asymmetric. ANT seeks to address this by asking that both human and non-human actants be considered *symmetrically* in studies (Latour 1987, p. 144).

Unfortunately, this concept of *symmetry* within ANT is often misread and therefore misapplied. Pickering, for example, has written that ANT’s symmetry:

[I]nsists there is no difference between human and non-human agents: human and non-human agency can be continuously transformed into one another (1993, p. 565).

Pickering is not alone in this reading of ANT, where symmetry is understood as a lack of distinction between the human and non-human. Amsterdamska concurs in this reading, charging that:

Latour entreats us to consider science and technology as a heterogeneous network and to abandon all distinctions between humans and nonhumans (1990, p. 499).

Collins and Yearly similarly read ANT's symmetric aims to treat:

[A]ll actants that are party to the scientific enterprise in the same manner (Collins and Yearley 1992, p. 322).

Thus, a number of scholars claim that ANT's tenet of symmetry is a means to flatten distinctions *between* various kinds of objects.²¹ This is not, however, my reading of ANT's symmetry, for according to Latour himself:

ANT is not, I repeat is not, the establishment of some absurd 'symmetry between humans and non-humans'. To be symmetric, for us, simply means not to impose *a priori* some spurious asymmetry among human intentional action and a material world of causal relations (2005, p. 76).

Here, Latour asserts explicitly that to read symmetry as Pickering, Amsterdamska, and Collins & Yearly have is 'absurd' (*ibid.*). He clarifies that the purpose of ANT's symmetry is to correct for the asymmetry between human intentionality and general material causality where the former is observed to be privileged in a preponderance of studies, thus closing off avenues of analysis before they start. He emphasises that symmetry in ANT has nothing to do with flattening distinctions between various objects, rather it is an entreaty to *include* various kinds of objects in causal analyses that might otherwise not.

In so arguing, Latour decentres the concept of human agency. Rather than privileging human agency over material causality as would a humanist, Latour suggests a posthuman perspective where agencies are symmetrically considered in relation to how specific phenomena are materialised. This position raises compelling questions of human²² and computational²³ agency, as well as what might lie in between.²⁴

Thus, the call of symmetry is simply to:

²¹More generally, such debates have raged around ANT since its inception. See chapters 10-13 in Pickering's edited volume (1992) for one such exchange.

²²For positions on a human conception of agency, see Taylor 1985, pp. 15-44; Emirbayer and Mische 1998.

²³For positions on computational agency, see Agre 1995; Kallinikos 2011; Noth 2009.

²⁴For positions that assert a materialist ontology of agency, see Barad 2003; Haraway 1988; Harman 2011; Miller 2005; Law 1992, 1994; Latour 2005; Leonardi 2011; Orlikowski and Scott 2008; Pickering 1995; Suchman 2007.

[C]onsider *symmetrically* the efforts to enrol and control human and non-human resources (italics in original, Latour 1987, p. 144).

This view is supported by reference works, such as Crawford's entry for ANT in Ritzer's *Encyclopedia of Social Theory* (2004) which describes as a principle of ANT, a:

[G]eneralized symmetry, employing a single explanatory frame when interpreting actants, human and nonhuman (Crawford 2004, p. 2).

My point then is to clarify how symmetry in ANT is positioned within the literature, and according to Latour, involves the *consideration* of agency. In contrast to these positions, we see that Pickering and others' *conflation* of agency with the notion of symmetry within ANT is misinformed when compared to Latour's and encyclopædic reference points.

Taking Latour and Crawford's interpretation of symmetry as my interpretation, the concept of symmetry becomes useful in this study if I am to adequately interrogate relations between leadership practices and computational objects. Such relations already imply a network where the established literature has virtually and asymmetrically ignored the latter. By focusing more on the network of production, and the artefacts and practices involved, the concept of symmetry guides me to guard against *a priori* distinctions between human intentionality and causal relations, and instead to trace networks of people and objects to better understand the relational emergence of particular phenomena (Latour 1999, p. 24). This leads to questions of what precisely the researcher should trace when following such networks. *Translation* helps to address this question.

Translation According to Latour, translation is a:

[T]erm that crisscrosses the modernist settlement. In its linguistic and material connotations, it refers to all the displacements through other actors whose mediation is indispensable for any action to occur. In place of a rigid opposition between context and content, chains of translation refer to the work through which actors modify, displace, and translate their various and contradictory interests (*ibid.*, p. 311).²⁵

Translation has been operationalised in a number of ways in ANT studies. For example, when hotel keys have heavy weights added to them, they are *translated* into artefacts that inscribe a message to its user to return them (Akrich and Latour 1992; Latour 1992). Similarly, as human door porters are replaced with machines that close doors

²⁵This definition comes from a particularly helpful glossary found within *Pandora's Hope* (Latour 1999, pp. 303-311), which I found to be a tremendous utility for unpacking ANT terminology.

automatically, a *translation* has also taken place (Latour 1992, pp. 229-234). Such translations involve decomposing a common object into its *assemblage*, where, in the case of the hotel key, the weighted keyring added to the key forms an *assemblage* of objects users refer to singularly as 'key'. An analysis of the various components and their functions within an assemblage is what, in ANT, is referred to as opening a *black box* (1981, p. 285). Thus, through the opening of black boxes, translation can be understood as a change in practice and attendant meanings, when a way of doing something is transformed by changing artefacts and/or methods.

However, translation is not always successful. As Callon (1986a) clearly shows, experiments involving sea scallops, which researchers study by *enrolling* them to lay their larvae on collecting devices, failed to produce results. When evidence of these experiments was reviewed, it was found that the scallops had not used the collectors to lay their larvae and, as a result, no data could be collected. Callon describes these scallops as 'dissidents' who 'refuse to enter the collectors' (*ibid.*, p. 212). It is not, however, that Callon is ascribing intentionality to the scallops; rather, he is amplifying the agential fact that without the scallops entering the collectors and placing their larvae, 'representivity is brought into question' (*ibid.*). Here, translation fails to happen but, importantly, in its absence it highlights that translation does not just mean changing one physical artefact (a human door porter) for another (a door-closing machine); it also suggests ways that in its *representation*, what data is *said* to represent has already undergone a translation. That is, the use of *reference* is a form of translation-in-action.

Circulation of Reference Nowhere does this concept of the translation of reference come more to the fore than in Latour's study of the Brazilian savannah entitled *Circulating Reference* (1999, pp. 24-79).

Latour deploys this term to refer to the way in which objects and meanings are altered through various translations. Through various practices Latour describes in detail, actors construct meanings through chains of translations. As translations progress, what is local, particular, and material becomes a compatible and standardised *reference* that can be more easily amplified. Latour's example of this follows (among other things) a leaf in the Brazilian savannah that is ultimately translated, through a multitude of activities into a data point in a report. This report can then be circulated by post, fax, or email. The report (which is itself a reference) and the references contained therein are thus said to be *circulated*. Circulating reference, according to Latour, is one of the ways knowledge is produced, and is a 'trade-off between what is gained (amplification) and what is lost (reduction) at each information-producing step' (*ibid.*, p. 71). By revealing the various stages that the leaf goes through to achieve this reified referential state, Latour exposes

a hidden aspect of scientific practice whereby ‘successive stages link us to an aligned, transformed, constructed world’ (1999, p. 79).

Thus, the concept of *circulating reference* involves a symmetric study of people and objects, traces these relational networks looking for evidence of translations of interest, and understands that these translations show up in a variety of ways, from physical artefacts to materially inscribed references. This movement, if you will, from originary object of interest to ultimate reference is critical to an understanding of ANT, as the successive translations produce qualitative distinctions in the production and transmission of meanings in the movement from originary object to distant reference. This culminating dynamic is illustrated in figure 2.8.

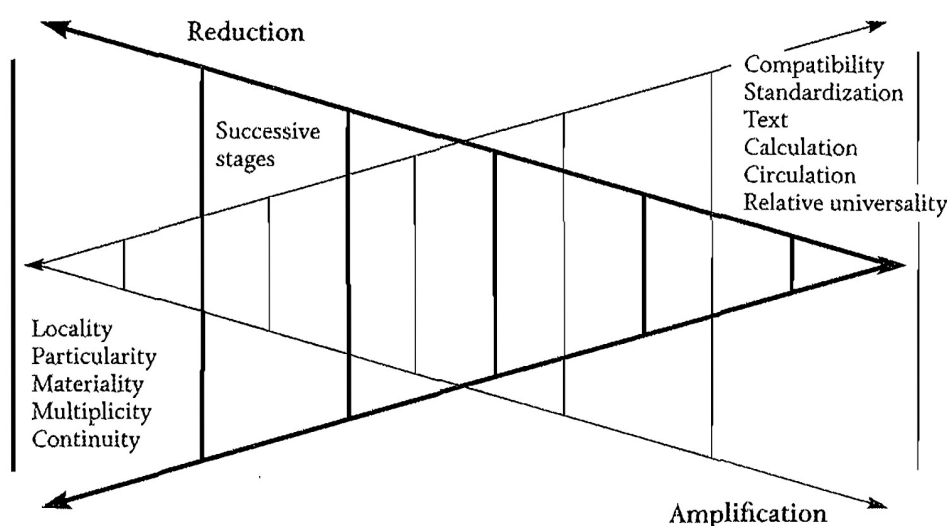


Figure 2.8: Latour's Transformation of Reference (1999, p. 71)

Figure 2.8 depicts the changing agencies that are observed in association with objects as they are translated. On the left of the diagram, objects are local, particular, and distinctively material. For example, the leaf collected by a botanist in Latour's study was part of a particular plant in a particular location in a Brazilian savannah. When it was taken from the plant and attached to a piece of paper where particular characteristics were noted (e.g., identifying number, colour, or location), these practices mark a transformation from originary object to translated reference. As the referential object then moves back to the lab along with the scientists, it is catalogued and placed in a special filing system, which in turn enables it to be located in the future; and another translation has taken place. Ultimately, in Latour's study, the leaf is referenced in a report that is sent by fax from Brazil to Paris. This is yet another transformation, where, if you will, a reference of a reference of

a reference (and so on...) of the leaf is mobilised and translated by the scientists to meet their needs.

However, in following this trajectory from originary object (the leaf) to successive reference (the reference to leaf in a report), Latour notes that the object is both *reduced* and *amplified*. As this movement progresses, the qualities of *compatibility*, *standardisation*, *textuality*, *calculation*, and *circulation* become increasingly salient. These properties emerge from the particular translations that Latour observed, in this case, during the human scientific practices of botany that involve the production of scientific reports.

This theoretical framing allows for a range of important interpretations, including agency and power, decentring the human in society, associations and their 'effects', and action at a distance, all of which may be useful in this study. It also asks us to question traditional distinctions between relations of objects, thereby sensitising the researcher to the manner in which networks and their various enactments alter boundaries, produce variations, and both establish and isolate relations.

Actor-Network Theory in Sum Taken together, these central concepts from ANT (symmetry, translation, and circulating reference) reveal a posthuman and processual perspectives that emphasise practices, how practices change, and how networks of people and objects are imbricated in the production of phenomena. I believe these ideas hold practical utility for the present study. There is much I have not said, and for this, I refer the reader to many of the sources cited in this review. In the next section I will continue by describing agential realism in a similar fashion, showing how ANT and agential realism are similar and, in particular, highlight aspects of agential realism that further sharpen the theoretical foundations of this research.

2.3.7.2 Agential Realism

The 'onto-ethico-epistemology and philosophy-physics' (Van der Tuin 2011, p. 31) of Barad's Agential realism is complementary to actor-network theory (ANT) in many respects. Sounding remarkably like Law's description of ANT in section 2.3.7.1 on page 53, Barad describes the proposition of agential realism as:

[A]n epistemological-ontological-ethical framework that provides an understanding of the role of human *and* nonhuman, material *and* discursive, and natural *and* cultural factors in scientific and other social-material practices, thereby moving such considerations beyond the well-worn debates that pit constructivism against realism, agency against structure, and idealism against materialism. Indeed, the new philosophical framework that I propose entails

a rethinking of fundamental concepts that support such binary thinking, including the notions of matter, discourse, causality, agency, power, identity, embodiment, objectivity, space, and time (*italics in original*, 2007, p. 26).

Like ANT, agential realism is anti-essentialist and takes a processual stance with respect to the emergence of phenomena. Both are also closely concerned with practices. Thus, where Latour analyses as an ‘assemblage of human and non-human elements’ (Latour 1999, p. 159), Barad explores ‘material-discursive practice’ (2007, p. 178), but both of these concepts are mobilised to argue the same point: that materialities and meanings of practices are not only co-constituted but inseparable.

However, agential realism is distinctive from ANT in important ways. They arise through different genealogies. Whereas ANT arises out of the milieu of social constructionism and appears to draw on the method of *bricolage* (Lévi-Strauss 1966, p. 17) in bringing together influences from ethnomethodology, semiotics, and sociology (Latour 2003), agential realism emerges instead from a hybrid of feminist technoscience (Haraway 1997; Harding 1991; Suchman 2002) diffracted through the quantum physics-philosophy of Niels Bohr (1934 / 2011, 1958, 1963; 1937 / 1998). By taking such a different route, agential realism moves beyond many other ‘new materialisms’ (Dolphijn and Van der Tuin 2012, p. 48), purposefully disrupting and undermining our understandings of ‘the substance of matter as we know it’ (Kleinman 2014, p. 76). Moreover, in grounding its assumptions in quantum field theory, agential realism grounds itself *between* positivist and interpretive approaches (Henfridsson and Bygstad 2013, p. 910).

My outline will sketch out the distinctive features of agential realism, explaining how and why they add to the theoretical framework I employ to interrogate the relations between leadership practices and computational objects.²⁶ The central concepts I will address here include:

- Indeterminacy
- Material-Discursive Practice
- Agential Cuts

Indeterminacy Barad’s agential realism is a framework spanning ontological, ethical, epistemological, and philosophical boundaries (Van der Tuin 2011, p. 31) built on the implications of quantum field theory. Based on these, it makes certain claims about knowledge and reality (2007, pp. 97-131). Barad is not the first to deploy quantum field theory as

²⁶For those who may wish to explore the terrain agential realism in greater depth, in addition to the work of Barad, see Davis 2009; Dolphijn and Van der Tuin 2012, pp. 48-70; Kirby 2011; Kleinman 2014; Rouse 2004; Žižek 2012, pp. 905-961.

a means to ground such understandings. Indeed, many scholars have linked work located in the poststructural move within the arc of social theory as described in section 2.3.4 to ideas brought forward within quantum field theory (cf. Abbott 2001, pp. 185-186; Argyros 1990; Brink 2007; Lord, Dinh et al. 2015; Murphy 1998; Norris 2000; Kirby 2011; Plotnitsky 1994; Protevi 2001). Such moves are also often strongly resisted, as exemplified by Sokal's hoax/experiment (Sokal 1996; Swoyer 2003), the subsequent media coverage emerging from it (Scott 1996), and the manner in which the academic interchange following it revealed:

[T]he overall hostile and unprofessional—and, one might indeed say, *unscientific*—attitude towards the work of Derrida and other figures on the part of the scientists involved (Plotnitsky 1997, p. 12).

Thus, it is not possible to discuss quantum field theory and social theory in the same sentence without acknowledging that the juncture of these two conceptual frames is also an essentially contested concept (ECC) (Gallie 1964). I previously raised the concept of the ECC in section 2.2.4.1, providing examples of changing views on gender equality, racial slavery, interracial and same-sex marriage, and a number of other combinations of socio-material elements that have undergone dramatic normative change in Western culture over the past few centuries. I suggest here that the highly contested juncture between quantum field theory and social theory may be a conceptual viewpoint whose value may come to be better understood and accepted over time, like how the Ptolemaic view of the Earth's position in the universe gave way to the Copernican.

Given this history, combining quantum field theory with social theory is potentially incendiary—and not to be taken lightly. However, agential realism exhorts:

First and foremost, as Haraway suggests, a diffractive methodology²⁷ is a critical practice for making a difference in the world. It is a commitment to understanding which differences matter, how they matter, and for whom (Barad 2007, p. 90).

Thus, a diffractive methodological approach is one whose aim is to make visible distinctions that may otherwise go unnoticed. It is on this basis that I engage with indeterminacy within quantum field theory, as I will argue along with Barad that an understanding of the mechanics of indeterminacy has a profound impact for our understanding of both knowledge and reality, with particular emphasis around the concept of agency. Given the questions of agency this study raises by asking what role(s) computational objects play in leadership practice, such a perspective is of consequence.

²⁷I elaborate on a diffractive methodology in much greater depth in section 3.1.2.

The approach I take in explaining indeterminacy in quantum field theory is the opposite from that which Barad takes. Instead of starting with the theoretical claims of agential realism and working backwards to indeterminacy within quantum field theory, I do the reverse. In doing so, I hope to offer the reader an alternative understanding, not only of agential realism's distinctive basis but of its value. Thus, I will engage with the 'discontinuity at the heart of matter itself' (Barad 2010, pp. 248-249), which quantum field theory attempts to explain.

Fortunately, we do not have to be quantum physicists ourselves to appreciate, as Grint notes in his study of leadership, the ongoing presence of indeterminacy (2001, pp. 413-419). In that study he argues we must recognise that a common fallacy of leadership involves a promise of certainty. Thus, indeterminacy already finds its way into leadership studies; a better understanding of its basis, I argue, is therefore useful.

So then, what is the principal feature of quantum field theory that foregrounds indeterminacy? This is located in Planck's constant, ' h ' (1906). ' h ' represents a value for the minimum possible energy unit known for matter to emit as it changes state. It is 'the "quantum of action" or the "element of action"' (Planck quoted in Kuhn 1978, p. 130).

' h ' is important in this discussion because it marks a theoretical move from a view of the universe that is precise and deterministic to one that is probabilistic and indeterminate. Previously, Newtonian physics held a deterministic view of physical reality made clear through its laws, and as part of this conception, assumed that matter could take on any continuous value. Planck's constant ' h ' and its subsequent acceptance by the scientific community demonstrates that a shift in thinking that diverges from the Newtonian has occurred (Kuhn 1978). Moreover, viewed diffractively from the social sciences, such observations regarding indeterminacy suggest that what is noticed about ourselves, as in the case of Grint (2001, pp. 413-419), is consistent with what is also noticed about the universe itself in the case of Planck. Here, it must be acknowledged that a possible cause for this relation is that 'we' and 'the universe' are composed of the same materiality. One possible line of thought here is that as members of the universe, and thus being based in matter ourselves, we, like all other matter, are also subject to/productions of matter's manifest potential. Thus, it is not 'we' who are uniquely endowed with agency and capability, but rather than 'we' are part of a universe that expresses agency across a range of manifestations. This is a posthuman perspective, one that seeks to explore alternative views that displace a 'Ptolemaic' human exceptionalism, offering instead:

[A]n ontology where humans are no longer monarchs of being but are instead *among* beings, *entangled* in beings, and *implicated* in other beings (italics in original, Bryant 2011, p. 40).

Therefore, in contrast to a Newtonian view, in quantum field theory, matter is shown to change states in discrete units. One way to think about this shift in conceptual perspective is moving from a view of reality as unfolding seamlessly to one where reality unfolds rather like the stop-motion movement by which a movie projector produces the appearance of movement. Planck's discovery of ' h ' is seen to be the initial finding that launched research and resulted in the body of knowledge that, little more than a century later, is now called *quantum field theory* (Kuhn 1978, pp. 72-91).

Barad describes the implications of indeterminacy in quantum field theory by detailing the findings of research experiments in this domain. For example, she explains from a quantum field theory perspective the change in energy state of a hydrogen atom when one of its electrons moves to a different orbital:

Quantum leaps aren't jumps (large or small) through space and time. An electron that 'leaps' from one orbital to another does not travel along some continuous trajectory from here-now to there-then. Indeed, *at no time does the electron occupy any spatial point in between the two orbitals*. But this is not what makes this event really queer. What makes a quantum leap unlike any other is that *there is no determinate answer to the question of where and when they happen* [... This phenomenon marks] the intra-play of continuity and discontinuity, determinacy and indeterminacy, possibility and impossibility that constitutes the differential spacetime-matterings of the world (my emphasis, 2007, p. 182).

Thus, quantum field theory *problematizes* classical views of physics by illuminating disjunctures in what was previously understood as continuous time and space. Barad's use of the specialised term *spacetime-matterings* is the deployment of one of Haraway's techniques, the *implosion* (Barad 2012b, p. 50), where words previously understood to be separate and bounded entities are problematised by joining them together. In this case, the implosion denotes that from the perspective of quantum field theory, space and time are phenomena that arise out of the intra-action of matter. Note also that *matter* in this construction becomes the gerund *matterings*. In this form, matter, rather than a noun, becomes a verb form, an object of action. It thus is marked as possessing an agency of its own.

To recapitulate, when a hydrogen atom changes energy state, rather than an electron moving along a smooth, linear trajectory in space and time from one orbital to another, what experiments in quantum field theory tell us is that it does so in a non-linear and non-deterministic fashion. In so doing, it *bypasses* time and space. Thus, during state change, electrons are understood to *dematerialise* from time and space and *materialise*

elsewhere—instantaneously. This is the so-called *quantum leap*, which Barad rightly notes is not a leap at all (2012b, p. 39), but rather a window into the indeterminacy on which our very existence arises in relation to, moment to moment.

Hence, Barad describes the universe as a recursive and iterative performance of intra-action where:

Materiality itself is a factor in materialization. The dynamics of mattering are nonlinear: the specific nature of the material configurations of the apparatuses of bodily production, which are themselves phenomena in the process of materializing, matters to the materialization of the specific phenomena of which they are a part, which matters to the ongoing materialization of the world in its intra-active becoming, and so on; that is, matter is enfolded into itself in its ongoing materialization (2007, p. 180).

In this fashion, Barad underscores the central role matter and its ongoing indeterminate state changes play in the (re)configuration of the emergent phenomena of time and space. To wit, findings from quantum field theory show that forces like gravity are seen to disrupt the very continuity of time (Müller et al. 2010) and offer experimental evidence that time is an emergent property, or what can be thought of as a side-effect, of quantum entanglement (Moreva et al. 2014). As a result, within a quantum field theoretical perspective, space and time are redefined. They become what Barad would call phenomena, or ‘basic units of reality’ (2007, p. 33) produced by intra-actions which signify ‘the mutual constitution of entangled agencies’ (*ibid.*) and which can always be traced back to ‘specific material arrangements’ (*ibid.*, p. 54).

Thus, under agential realism:

[P]roperties are only determinate given the existence of particular material arrangements that give definition to the corresponding concept in question. (*ibid.*, p. 261)

In other words, a given materialisation—and all it ‘contains’—does not pre-exist its own indeterminate appearance. However, this is not to say, as some have inferred, that there is no past or that agential realism ‘ignores the role of time’ (Mutch 2013, p. 32). Rather, Barad offers the explicit proviso that agential realism:

[P]oses an altogether different way of thinking about temporality, spatiality, and possibility. Intra-actions always entail particular exclusions, and exclusions foreclose the possibility of determinism, providing the condition of an

open future [...] Possibilities aren't narrowed in their realization; new possibilities open up as others that might have been possible are now excluded: possibilities are reconfigured and reconfiguring [...] The notion of intra-actions reformulates the traditional notions of causality and agency in an ongoing reconfiguring of both the real and the possible (2007, p. 177).

Taking these two quotes together, my reading of Barad is that within the space of any 'now', specific possibilities exist for state change or 'future' while other possibilities are foreclosed. Thus, given a state change from T_0 to T_1 , the possibilities available to be materialised in T_1 arise out of the arrangements in place at T_0 . In such a model, possibilities for the T_1 are enabled and constrained by the state of affairs at T_0 . Thus, agential realism recognises that time and space are *phenomena* arising from the intra-actions of matter, and thus, view time in a different light than scholars, like Mutch (2013), may be familiar with. Instead of focusing on 'time' and 'history', and any relationship these might have to 'structure', agential realism looks instead towards the iterative, processual, ongoing emergence and withdrawal of phenomena as enabled and constrained by successive states of mattering. This is why Barad asserts that:

Matter is always already an ongoing historicity (2007, p. 151).

Moreover, drawing on the work of Von Neumann (1932 / 1955), Stapp asserts that perception under quantum field theory no longer involves an objective account of what is 'out there'. Instead, perception is a process involving:

[A] large continuous collection of perceivable worlds. In each individual empirical instance some process must pick out the perception that actually occurs from the continuous mixture of possibilities generated by the Schrödinger equation (2012, p. 604).

In other words, from a quantum field theoretical perspective, the world 'out there' is nothing more than an indeterminate, probabilistic set for some perceptual agency to determine, in each empirical materialisation, from that set. In such a view, objects and boundaries do not pre-exist their materialisation, where such materialisation necessarily includes the discursive process of perception. This determination involves not only an observer (or observers) but also 'a choice on the part of nature' (Dirac quoted in *ibid.*, p. 603), that is, agential factors beyond the observer alone that also determine perception. Under such views, quantum field theory can be *likened* to post-structural social theory as embodied in work of Derrida when he asserted that:

There is no support to be found and no depth to be had for this bottomless chessboard where being is set in play (1982, p. 296).

In this quote, Derrida uses the metaphor of the chessboard on which the game of 'being' is played, but tells us that the taken-for-granted solidity of the chessboard is without either support or depth. Invoking infinity, he tells us that the reality which we take to be a chessboard is actually 'bottomless'. This is an anti-essentialist stance, and thus, the game is made-up, the rules are not given but imagined, and yet, paradoxically, the game is ongoing, never-ending, and thus, 'bottomless'. Derrida is, in my reading, using this metaphor to speak for the ongoing, never-ending possibility for the interpretation and re-interpretation of text, where meaning conjuncts with being. The *possibility* for such ongoing interpretation is precisely what indeterminacy affords within agential realism.

Indeed, analogical comparisons between disciplines as far afield as post-structuralist theory, as embodied in Derrida, and in mathematics, as embodied in Gödel (1931), have been noted by commentators (Plotnitsky 1994, p. 2). In this sense, the influence I argued for with respect to the arc of social theory on leadership in section 2.3 may be significantly wider than encompassing only that particular relation. Viewed through this perspective, Gödel's incompleteness theorem (1931), the advent of quantum field theory, and the fifth move in social theory as described in section 2.3.5 can be aggregately conceptualised as deriving from parallel observations of indeterminacy and discontinuity. It is this growing awareness of indeterminacy that is a principal legacy of twentieth-century science.

Thus, when diffracted through these views of quantum field theory, Grint's assertion that 'leadership is an indeterminate skill that masquerades as a determinate skill' (2001, p. 419) takes on an entirely new meaning, since, according to a quantum field theory view, *everything* that is materialised is masquerading as something determinate. Grint then is simply applying what quantum field theory tells us about reality to the understanding of leadership.

Such views on space, time, matter, or, as Barad problematises it, *spacetime-matterings*, have implications for our understanding of knowledge and reality. First among these implications is the manner in which quantum field theory announces:

[T]he irreducible incompleteness of knowledge (as classically understood) (Plotnitsky 1994, p. 5).

This claim has standing independent from quantum field theory. For example, within organisational theory, and under a process studies ontology of change and becoming (Langley, Smallman et al. 2013, p. 4), the:

[S]emantics of knowledge representation in an organization are intrinsically unstable (Tsoukas and Chia 2002, p. 573).

So, given that social theory already speaks of indeterminacy, what does a quantum field theory perspective add to this argument? In my view, it offers a crucial source of empirical *evidence* that suggests the instability that Tsoukas and Chia (Tsoukas and Chia 2002) refer to is present *not only* in the specialised context of the organisation but in the workings of the universe itself. The quantum field theory perspective impresses on one just how pervasive and how present indeterminacy is in relation to what shows up as determinate. One might even go as far as saying that indeterminacy is fundamental to materialisation.

However, this is not an essentialist claim that indeterminacy is some ‘essential’ quality of universe; quite the opposite. Rather:

The sense in which this discontinuity is an ‘essential’ one is not that nature has a fixed essence, but that nature’s *lack* of a fixed essence is essential to what it is (my emphasis, Barad 2007, p. 422).

In other words it is the *lack* of any essential nature, made possible by a destabilising indeterminacy through and through, that characterises Barad’s view of the universe and the attendant possibilities that may arise from its current and future (re)configurations. Further:

Changes do not follow in continuous fashion from a given prior state or origin, nor do they follow some teleological trajectory—there are no trajectories (*ibid.*, p. 181).

So, in a Baradian world, like that of Grint’s, there is an anti-essentialism. However, in place of determinism and continuity, Barad offers the indeterminacy observed in quantum field theory experiments as a means to argue for a much broader view of agency, opening the door to a posthuman perspective. It is for these reasons that I suggest that indeterminacy is a crucial concept in agential realism and one that adds depth to the consideration of the research questions this study raises.

Material-Discursive Practice Material-discursive practice is a *site* (Schatzki 2002, p. xi) where materiality and meanings are (re)configured and co-constituted. I elaborate here on this central concept within agential realism.

Recall that in discussing indeterminacy above, I referred to findings from quantum field theory studies demonstrating that phenomena, such as time and space, are emergent (Moreva et al. 2014; Müller et al. 2010). In terms of agential realism, these phenomena materialise and de-materialise through ongoing, agential intra-actions (Barad 2007, p. 180). Such phenomena are the ‘basic units of reality’ (*ibid.*, p. 33) that can be traced back to

specific material-discursive practices (Barad 2007, p. 54). Taken together, this leads to a processual view of the simultaneous materialisation of both meaning *and* matter through material-discursive practice.

In order to better understand material-discursive practice within agential realism, it is helpful to build up that understanding from its constituent terms of *agency*, *practice*, *apparatuses*, *matter*, *performativity*, and *meaning*, all of which agential realism significantly respecifies. Moreover, as I will explain, these terms also mark the overall process of agential intra-action.

In line with both Einstein's theory of relativity, which expresses the equivalence relation between matter and energy (1916 / 2013), and the move in social sciences to unify subject and object as described in section 2.3.5, the terms *agency*, *practice*, *apparatuses*, *matter*, *performativity*, and *meaning* all describe different *aspects* of the ongoing process of agential intra-action. They flow through one another, as ice melts to water, and water becomes cloud, which, in turn, can form rain or snow. Thus, within agential realism matter is a 'congealing of agency' (Barad 2007, p. 151); the agency is within its materialisation. All of these terms, in fact, morph into one another, producing and withdrawing phenomena through specific material-discursive practices, that is, empirically identifiable and describable cases of intra-action. This processual set of relations of material-discursive practice is depicted in figure 2.9.

Figure 2.9 is purposefully presented in a manner similar to an atomic model to remind the reader that the claims of agential realism are based not on supposition but rather built up from actual experimental findings in quantum field theory, many of which centre on behaviours at an atomic level. That level, as distant as it may seem to humans and, according to scientific findings, as minute as the strange quantum effects they describe may be, remain at the basis of our existence; for we and the world we inhabit are built of the same atoms that quantum field theory investigates. The fundamental indeterminacy that quantum field theory reveals is therefore within the atoms that form us and the world as we know it. Given these conditions, it is productive to deploy a theoretical perspective that brings greater attention to the ground we figuratively and literally stand upon.

The various nodes in figure 2.9 surround and touch/merge with a nucleus of *phenomena* at its centre, *phenomena* which Barad asserts as 'the primary ontological unit' (*ibid.*, p. 139). Elsewhere, Barad states that '*phenomena are the ontological inseparability of agentially intra-acting 'components'*' (italics in original, *ibid.*, pp. 308-309). These components are the nodes depicted around the *phenomena* in figure 2.9 and, according to Barad, are ontologically inseparable from the phenomena produced and withdrawn and, as I will also explain, also interpenetrate one another in important ways. In order to indicate their component-like relation to phenomena, a ring of the intra-active elements *agency*, *prac-*

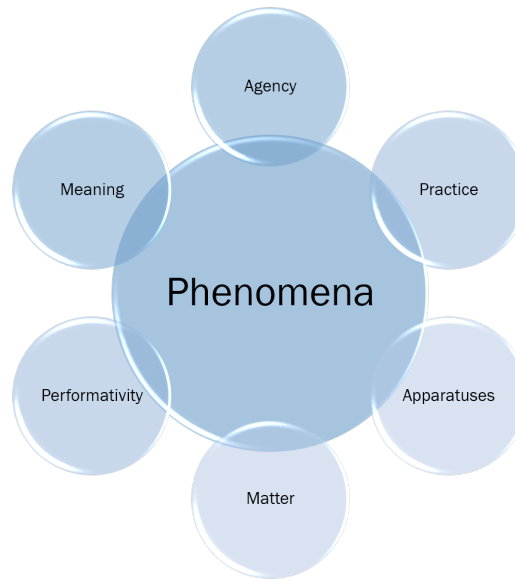


Figure 2.9: The Material-Discursive Practice of Intra-Action (based on Barad 2007)

tice, *apparatuses*, *matter*, *performativity*, and *meaning* surround the very *phenomena* they produce and withdraw, representing a material-discursive practice.

With respect to the first node, *agency*, Barad argues that:

[A]gency is a matter of intra-acting; it is an enactment, not something that someone or something has. It cannot be designated as an attribute of subjects or objects [...] It is not an attribute whatsoever. Agency is ‘doing’ or ‘being’ in its intra-activity. It is the enactment of iterative changes to particular practices (italics in original, 2007, p. 178).

This claim regarding *agency* is far-reaching, going well-beyond the ANT claim of a distributed form of agency spanning human and non-human; instead agential realism suggests that agency be reconceptualised as *enactment-in-practice*. Hence, in agential realism, *agency* is evidenced by materialisation itself. Or, put differently, any materialisation is accomplished through practices of agential intra-action, resulting in the differential expression of phenomena.

Moreover, any notion of ‘practice’ in agential realism is markedly posthuman. Barad explains that practices are not:

[A]nthropomorphic placeholders for the projected agency of individual subjects, culture, or language. Indeed, they are not [limited to] human-based practices. On the contrary, agential realism’s posthumanist account [...] does not fix the boundary between human and nonhuman before the analysis ever

gets off the ground, but rather allows for the possibility of a geneological analysis of the material-discursive emergence of the human (Barad 2007, p. 150).

Consequently, in contrast to Schatzki's definition of practice as 'bodily doings and sayings' (2002, p. 72), marking them as distinctively human, agential realism views such human practices as a subset of the broader practices of the universe agentially intra-acting with itself.

To indicate and unpack specific agencies enacted in practice, Barad speaks of 'practices or apparatuses of bodily production' (2007, p. 140). Note here the conflation of *practice* and *apparatus*. This is not a sleight of hand, nor is it an error. Rather, a posthuman view of practice as articulated by agential realism is consistent with the claim that practice can be enacted *by* apparatuses, such as the computational objects which are focal to the present study. This brings us back to *agency*, which Barad reconceptualises as a '*doing*' (italics in original, *ibid.*, p. 178). Thus, within agential realism the concepts of *agency*, *practice*, and *apparatuses* all flow into one another in relation to phenomenal materialisation and its withdrawal.

While the trope 'apparatuses of bodily production' (*ibid.*, p. 140) originates in the work of Haraway (1991b, pp. 352-370), it is also clear that in the work of Barad, the term 'apparatus' is also taken from Bohr (see Barad 2007, p. 19), specifically, within the Copenhagen interpretation of quantum field theory, which describes a methodology for conducting scientific experiments (Stapp 2012, p. 602). Yet, agential realism does not limit its claims to experimental conditions involving laboratory apparatus. While the underlying assumptions of agential realism are drawn from laboratory experiments in quantum field theory, its overall argument attempts to productively generalise those findings to the universe as we know it. Accordingly, the addition of 'bodily production' (2007, p. 140) in my reading, broadens what is meant in agential realism by *apparatuses*. It suggests a materiality and attendant individuation, simultaneously indicating that *apparatuses* can be scientific measuring devices in a laboratory as well as human beings on a picnic.

The concept of *apparatuses* is also elaborated in agential realism through the idea of 'material arrangements' (*ibid.*, p. 142); that is, the material objects such as laboratory equipment and humans that might be arranged in specific ways in order to measure certain phenomena in a scientific experiment. However, of these arrangements, Barad asserts:

[T]hat the apparatuses of bodily production (which are themselves phenomena) are (also) part of the phenomena they produce (2003, p. 826).

Here we see that while *apparatuses* can be analytically identified (e.g., an electron gun and a screen), Barad reminds us that all materialisations are *also* phenomena. Indeed,

within agential realism that which materialises is both a phenomenon and agential. This seemingly circular reference is not a contradiction of any sort; rather, it elaborates on the ‘discontinuity at the heart of matter itself’ (Barad 2010, pp. 248-249) where determinate phenomena arise through intra-actions in an ontologically-indeterminate universe. In other words, apparatuses deployed in scientific experiments are also entangled in/part of the production of the phenomena they seek to measure. These phenomena, in turn, are agential, as ‘agency is a matter of changes in the apparatuses of bodily production’ (2003, p. 826).

And *matter*, too, within agential realism is not simply the ‘stuff’ in the world, but viewed as another ongoing step, or different vantage point, in the process of ongoing intra-action. It is thus respecified as:

[N]ot a thing but a doing, a congealing of agency [...] ‘Matter’ does not refer to an inherent, fixed property of abstract, independently existing objects; rather, ‘matter’ refers to phenomena in their ongoing materialization (italics in original Barad 2007, p. 151).

This idea that *matter* as a ‘congealing’ suggests that matter is agency slowed down, an entanglement of *agency* in form, as well as the indeterminate possibilities for its becoming, including withdrawal. Or, put differently, where *agency* is enactment-in-practice, *matter* is phenomena-in-materialisation. *Matter* always implies a specific material arrangement that can be further specified as an arrangement of *apparatuses*, all the while, remaining a phenomenon. Accordingly, in agential realism, *matter* is the agential field out of which phenomena are materialised. It is based on this reasoning that Barad claims:

[P]henomena are not the mere result of laboratory exercises engineered by human subjects; rather *phenomena are differential patterns of mattering* (‘diffraction patterns’) (italics in original, *ibid.*, p. 140).²⁸

Like the phenomenon of movement produced by the motion picture film, and its *apparatuses* of projector, film, screen, and viewer(s), *matter* becomes the location within where the phenomenon we understand as *being* is iteratively (re)produced.

As with *agency*, *practice*, *apparatuses*, and *matter*, *performativity* is also reconceptualised within agential realism. Critical of Butler’s (1993 / 2011) conceptualisation of *performativity*, Barad claims that Butler:

[S]eems to assume that it is ultimately derived (yet again) from the agency of language or culture. She fails to recognise matter’s dynamism (Barad 2007, p. 64).

²⁸See also section 3.1.2 for an elaboration of diffraction.

Barad argues that Butler's concerns are limited to a humanist frame, that is, the production of gendered, human bodies, and thus limits agency to humans (Barad 2007, p. 145). In the stead of a humanist, speech-act-centric (Austin 1975) account of performativity, Barad argues deconstructively that:

Performativity properly construed, is not an invitation to turn everything (including material bodies) into words; on the contrary, performativity is precisely a contestation of the excessive power granted to language to determine what is real. Hence, in ironic contrast to the misconception that would equate performativity with a form of linguistic monism that takes language to be the stuff of reality, performativity properly understood is a contestation of the unexamined habits of mind that grant language and other forms of representation more power in determining our ontologies than they deserve (2007, p. 133).

Here Barad objects to what she sees as an unwarranted emphasis on representationalism through the use of human language. For this reason, agential realism's conception of performativity is decidedly *posthuman*. This is a view that:

[C]alls into question the givenness of differential categories of human and nonhuman, examining practices through which these differential boundaries are stabilized and destabilized (*ibid.*, p. 66).

According to this view, *performativity* requires a critical assessment of how practices produce and withdraw certain phenomena:

[It] challenges the positioning of materiality as either a given or a mere effect of human agency [...and therefore proposes] a rethinking of the notions of discursive practices and material phenomena and the relationship between them (*ibid.*, p. 183).

Thus for Barad, *performativity* is a provocation to challenge humanist and representationist perspectives. This leads to one of agential realism's most distinctive claims: that the discursive practices of producing *meaning* are always already material. Consequently, Barad submits variously that:

The world is an ongoing open process of mattering through which 'mattering' itself acquires meaning and form in the realization of different agential possibilities (2003, p. 817).

Mattering is about the (contingent and temporary) becoming-determinate (and becoming-indeterminate) of *matter and meaning*, without fixity, without closure (2010, p. 254).

In other words, materiality is discursive (i.e., material phenomena are inseparable from the apparatuses of bodily production; matter emerges out of, and includes as part of its being, the ongoing reconfiguring of boundaries), just as discursive practices are always already material (i.e., they are ongoing material [re]configurings of the world). Discursive practices and material phenomena do not stand in a relationship of externality to each other; rather, *the material and the discursive are mutually implicated in the dynamics of intra-activity*. The relationship between the material and the discursive is one of mutual entailment. Neither discursive practices nor material phenomena are ontologically or epistemologically prior. Neither can be explained in terms of the other. Neither is reducible to the other. Neither has privileged status in determining the other. Neither is articulated or articulable in the absence of the other; matter and meaning are mutually articulated (italics in original, 2007, pp. 151-152).

In this capstone relation, *meaning* is bound to the other components of agential intra-action and for this reason within agential realism, the neologism of *material-discursive* is employed.

Material-Discursive Practice Summarised All of these various respecifications of *agency, practice, apparatuses, matter, performativity, and meaning* I have outlined are encapsulated within the term material-discursive practice where:

[P]henomena are not the mere result of laboratory exercises engineered by human subjects; rather *phenomena are differential patterns of mattering* ('diffraction patterns') produced through complex agential intra-actions of multiple material-discursive practices or apparatuses of bodily production where *apparatuses are not merely observing instruments but boundary-drawing practices—specific material (re)configurings of the world—which come to matter*. These causal intra-actions need not involve humans. Indeed, it is through such practices that the differential boundaries between humans and nonhumans, culture and nature, science and the social are constituted (italics in original, *ibid.*, p. 140).

Thus, material-discursive practices are specific enactments that can also be described as agencies, practices, apparatuses, matter, performativity, and meanings, all of which result in the ongoing production and withdrawal of phenomena.

Based on this complex set of relations, I suggest that the radical insights argued by agential realism which I have outlined here and which are encapsulated in the trope of material-discursive practice provide a basis for very different interpretations than what is provided by ANT. Yet, my interpretation is that the transformations of objects and meanings Latour writes of (Latour 1999, pp. 24-79) remain empirically compatible with Barad's construct of material-discursive practice, the linchpin within agential realism where meanings and matter are perpetually (re)configured (2007, pp. 148-149).

Agential Cuts The final piece of agential realism I would like to present here is the conceptual idea of the *agential cut*, which Barad explains is the enactment of:

[A] *local* resolution within the phenomenon of the inherent ontological indeterminacy (2003, p. 815).

In other words, the *agential cut* is a material-discursive practice where the boundaries of the entangled phenomena within spacetime-mattering are remade. It is where one state moves into another, as in the description of the electron's atom described on page 62. For just as its electron moves from 'here' to 'there' outside of time and space in a single move, so, what the atom was and what it will be are locally determined through an indeterminate *agential cut*—for the time being.

The 'cut' therefore has significant implications; namely what is included in the 'cut' and what is excluded, as these are the key factors that produce difference, the central concern of agential realism. Moreover, according to Barad, this 'cut' has two parts which are enacted in a single move, analogous to the 'here' to 'there' of the quantum leap; that which is 'cut away' and that which is 'cut together', where:

Scenes never rest but are reconfigured within and are dispersed and threaded through one another. Multiple entanglements, differences, cutting through and re-splicing one another (2010, pp. 244-245).

Crucially, in my reading, the *agential cut* is not something that humans can in any way engineer, although, as agential apparatuses themselves, humans certainly play a part. Instead, I find it helpful to think of the *agential cut* as what Dirac refers to as 'a choice on the part of nature' (Dirac quoted in Stapp 2012, p. 603) of the possibilities for outcome arising from a particular material-discursive arrangement. According to Stapp, von Neumann, in his interpretation of quantum mechanics, pushes the cut 'all the way

up' (Stapp 2012, p. 602) so that the 'observed' system contains all things that, according to classical ideas, are physical things, including the bodies and brains of all observers. These 'physical' things are all described in quantum mechanical terms. The classically described features of our perceptions become, then, aspects of the observing mental side of reality (*ibid.*).

In my reading, this perspective is crucial to understanding the *agential cut*; according to this view, our 'minds' are part and parcel of what is 'cut'. We are not 'outside' anything. We are at the effect of the cut and it is the universe that does the cutting, although we, like any other apparatus, have an impact on how the cut is made. But to come at the cut 'as if' we could 'control' it is, in my view, a misunderstanding of the whole point of how 'determinate' state comes to be. To take an example here, we enter into an 'experiment' to see if members accept whether what a computational object is doing is 'leadership'; we may convince the members, but we may not convince our peers. The cut, in this case lies in the (re)configuration of the boundary between 'peers' and 'informants', but any attempt to intentionally position the boundary will always include a broader set of material-discursive agencies rather than a set of human intentions and, as such, cannot be determined in advance.

Agential Realism in Sum The three key concepts I have covered in this outline of agential realism of *a*) indeterminacy, *b*) material-discursive practice, and *c*) agential cuts reformulate traditional approaches towards subjects and objects, agency, knowledge, and the way reality is produced. In so doing, agential realism opens thinking and subsequent analysis to include non-humans in a way that may lead to significant insights. Further, given the topic of this study, leadership practices and the role of computational objects, such a theoretical position is particularly inclusive of the phenomena I wish to study. This approach can therefore be utilised to build a leadership theory that more precisely explains what actually happens in these heretofore poorly understood congeries of man and machine (Kahai 2012, p. 63) when leadership is said to have been enacted.

2.3.7.3 Human-Technology Relations

The phenomenon of relationships between humans and computers is relatively recent. This, notwithstanding that computers are also artefacts and the 'ancientness of all such existential relations' (Ihde 1990, p. 110) as a category associated with the very meaning/origin of 'human' (Allenby et al. 2011), such an artefactual scope is far too broad for the topic at hand. Here, Ihde has made the topic of the relation between human and technology his primary focus at the level of philosophy for more than 25 years (Ihde 1990, 1998, 2002, 2009, 2010). Ihde's work builds on the phenomenological tradition, however he identi-

Relation	Description	Category
Embodiment relation	In this relation, the technology becomes transparent; humans thus experience the world <i>through</i> the technology.	Focal
Hermeneutic relation	In the relation, humans actively interpret the technology in order to make use of it, however, they may do so without realising their own interpretative practices.	Focal
Alterity relation	In this relation, distinctive qualities of the technology come to the fore in what Ihde describes as 'technological intentionalities' (1990, p. 103).	Focal
Background relation	This relation is located in spaces where the technology is experienced as a field. Although it may be in the background, Ihde argues that the transformational effects of this relation are equally as potent.	Field

Table 2.5: Ihde's Conceptualisation of Human-Technology Relations (1990)

fies his own work as 'postphenomenological', attempting to build on phenomenology to address twentieth-century realities through a specific focus on 'technologies in their particularities' (2009, p. 22). For these reasons, it is therefore highly compatible with the other theoretical lenses being deployed.

Ihde develops a perspective in *Technology and the Lifeworld: From Garden to Earth* (1990) asserting four general dimensions of being along a continuum of possible human-technology relationships. These are: *a) Embodiment relations*, *b) Hermeneutic relations*, *c) Alterity relations*, and *d) Background relations*. These four relations are summarised in table 2.5.

Embodiment relations can be understood as the application of Heidegger's famous tool-being argument about a hammer being subsumed into the phenomenological experience of hammering through *zuhandenheit* (1927 / Heidegger 1996, pp. 64-67). Here Ihde offers the example of eyeglasses that are worn, thus embodied by the human and in so doing, become perceptually 'transparent' (Ihde 1990, p. 47). Another example Ihde provides is of a user looking into a telescope and seeing the Moon through it. Thus, the user experiences not 'telescope' but instead 'Moon'. The telescope, like Heidegger's hammer, phenomenologically falls away in use. In Ihde's formulation, such an *Embodiment relation* possesses a quality of transparency that, for him, implies a 'symbiosis of artifact and user within a human action' (*ibid.*, p. 74).

According to Ihde, *Hermeneutic relations* go beyond *Embodiment relations* to a mode of being where the user makes an interpretation about the technology, perhaps without even realising it. As an example here, Ihde provides the thermometer, which has various numbers that must be read by the user in order for a result to be produced. Such readings, when well-practiced by users in a given scale such as Celsius, become experiences of 'constituted immediacy' (*ibid.*, p. 85).

The third human-technology relation is an *Alterity relation* where the human experiences 'technology-as-other' (*ibid.*, p. 98). Here Ihde proposes the comparison of a

‘spirited horse and a spirited sports car’ (1990, p. 99). Ihde suggests that the user of both horse and car experience the technology-as-other; however, a horse, being a living animal can resist the user in ways that a sports car cannot. While the former may disobey, the latter can only malfunction. For this reason, Ihde labels the particular quality of otherness possible in relation to technology as a ‘*quasi-otherness*, stronger than mere objectness but weaker than the otherness found within the animal kingdom or the human one’ (*ibid.*). Notably, through this particular relation, Ihde notes a quality he refers to as ‘technological intentionalities’ (*ibid.*, p. 103) that are, effectively, the unique characteristics produced through the technology in its enactment. Here Ihde offers the example of a sound recording robot that is placed in a lecture hall at the front of the room and records a lecture. He contrasts this to a human sitting at the back of the lecture hall who cannot hear the lecture very well. Were this user to play back the robot’s recording, the user would be able to take advantage of what Ihde refers as its ‘technological intentionality’ and hear the lecture. Simply put, the initially unique capabilities of technologies may at first appear as ‘other’ but when engaged with often enough, become normalised, leaving particular ‘capabilities’ or ‘technological intentionalities’ as the marker for the quasi-otherness for which Ihde argues (*ibid.*).

These first three relations can also be categorised of a general type which Ihde describes as *focal*, that is, they ‘stand within the very core of praxis’ through a human in relation to some technology with ‘implicated self-awareness’ (*ibid.*, p. 108). However, for Ihde, there is a fourth relation, *Background relations* that enables the charting of ‘fringe or background phenomena that are no more neutral than those of the foreground’ (*ibid.*). This reveals a category distinction between focal and field phenomena, both of which, Ihde argues, have significant effect.²⁹

Thus, *background relations* are those which are characterised by a shift from a *focal* to a *field* role. In other words, where the first three relations all involve some sort of active and present relation with the technology, this fourth dimension is instead concerned with the ways that technologies ‘texture environments’ (*ibid.*, p. 112) with particular consequences for human practice. According to Ihde, breakdowns are one site to understand this relation.³⁰ Here, he describes the 1985 Hurricane Gloria disaster which disrupted electric power on Long Island for up to two weeks. This disruption had myriad impacts on human practice, where, for example, ‘with the failure of refrigeration, eating habits had to change temporarily’ (*ibid.*, p. 111). Thus, Ihde argues that while the contextual aspect of this relation is quite different than the others, its transformational characteristics are no

²⁹There is also an interesting correspondence here between Ihde’s conception of focal and field and the quantum field theory basis of Barad’s agential realism which foregrounds the phenomenon of wave/particle duality.

³⁰See section 6.2 for a review of the literature on breakdowns.

less potent (Ihde 1990, p. 112).

In sum, I suggest that Ihde's conceptualisation provides a useful starting point to begin theorising about the roles of computational objects and any relation they may have to leadership practice.

2.3.8 Recapitulation

I have argued here that the progression of leadership theories appear to take their lead from ongoing developments arising out of social theory. These changes are reflected in an ongoing re-specification of the concept 'leadership' that exploits, chronologically, many of the moves found in social theory. Further, I have argued, following a wide range of scholars writing on pluralism (cf. Fuller and Collier 2004; James 1909; Rescher 1995; Shipilov et al. 2014; Turkle and Papert 1992), that the current state of leadership theory is an *existential* pluralism, where many theories exist simultaneously and are employed by different people in different contexts for different purposes. Such a state is, for some, a useful, distributed project to build a rich tapestry of knowledge. In keeping with these understandings and for the purpose of this study, I have outlined key aspects of actor-network theory (ANT), agential realism, and Ihde's human-technology relations, three philosophical frameworks from the post-structuralist move in social theory which reflect the most recent thinking in social theory, and are therefore likely to support novel theorising.

2.4 Conclusions and Direction of This Dissertation

In this chapter, I have engaged with a wide range of literatures in order to outline the theoretical grounding for the present study. I first presented a brief overview of the broad and essentially contested terrain (Gallie 1956) that is the study of leadership, showing that the story of leadership is told by different scholars in different ways, which reinforced my claim that leadership scholars have paid computational objects scant attention. Through an examination of the history of leadership I have confirmed that there is a space where there is an obvious lack of attention. This is the space where computational object may play some role in the enactment of leadership practice and is the central concern of this dissertation.

Here, I invoked the ontological position of sceptical constructivism (Grint and Woolgar 1997, p. 143) that encourages multiple interpretations of meaning. Following Grint (2005a, p. 1), I have argued that the pursuit of any single definition of leadership distracts from the broader question posed by sceptical constructivism: How is it that the particular views/ideologies of leadership come to be accepted as valid in particular societies, academic disciplines, and organisations? Here such ideologies apply not only to

leaders who may enact practices that align with a particular theory, but also to methods used by researchers to argue the existence of that theory within particular disciplines.

In line with Grint, I have argued that consensus on a definition is ‘forlorn and unnecessary’ (2005a, p. 1). Instead of a single definition, I synthesised a fivefold framework based on the work of Grint (*ibid.*, p. 18) and Kempster et al. (2011) to study leadership *in situ* and followed this with examples of how I extended this framework to address the observation of leadership practices in relation to computational objects.

In a broader sense, I have framed the study of leadership as a range of ideological positions based in social theory. To make this argument, I presented a summary of Daston and Galison’s (2007) panoramic study of objectivity as representative of the arc of social theory in five moves, as shown in table 2.2. Based on this, I made the claim that the development of leadership theory draws, *post hoc*, against the major developments in social theory. To illustrate this, I presented a range of leadership theories based on Palmer and Hardy’s review of the various schools of leadership, also summarised in five moves and rendered as table 2.3. I then compared these moves temporally, noting that the moves in leadership lag behind the moves in social theory. This analysis is summarised in table 2.4. In keeping with this argument, I suggested that the most recent move in social theory, that of attempting to *unify subject and object*, offers a range of theories that may prove helpful to develop a theory of leadership that includes both humans and computational objects.

Thus, the working hypothesis of this dissertation is that the future of leadership theorising lies in following the arc of social theory. This suggests that there are resources and approaches that can be mobilised which hold the possibility to reveal to us something about leadership that extant approaches have not. To this end, I explained key aspects of Latour’s ANT (Latour 1994, 1999, 2005), Barad’s agential realism (Barad 2003, 2007) and Ihde’s conceptualisation of human-technology relations (1990), which I mobilise in this study. In so doing, this dissertation seeks to expand extant debates in leadership into areas not commonly considered within current theorising.

I also touched on how developments in the disciplines of human-computer interaction (HCI), information systems (IS), organisational studies (OS), and science and technology studies (STS) help to frame and analyse relationships between leadership practices and computational objects. Here I claimed that many of the studies that have been undertaken in these domains converge on a useful set of theoretical bases around the rubric of practice theory (PT) (Nicolini 2012; Reckwitz 2002; Schatzki 2002; Shove et al. 2012a). I have noted that PT-based approaches have been constructively applied in a wide range of fields and have noted their particular attention to relations between people and computational objects. For these reasons, I have argued that this theoretical approach provides an appropriate theoretical lens to study the phenomenon of interest to the present study: the

relationship between leadership practice and computational objects.

The results from the preliminary investigation I have presented in this chapter show that *a)* there exists a lack of research on computational object and how their involvement with leadership practice and *b)* that in addressing this, it would be prudent to take advantage of recent developments in the social sciences that leadership has not yet incorporated. This is the area of my research.

Within this scope, the research will explore the following questions:

1. What roles do computational objects play in the enactments of leadership practices?
2. How do informants' perceptions and use of computational objects align with respect to the constitution, (re)production, and articulation of leadership practice?
3. How is 'leadership' produced and recognised *qua* 'leadership' in practice?

I will therefore attend to the practices enacted in partnership with computational objects in order to gain an understanding of the roles these objects play. I will explore how informants perceive the computational objects they work with and compare these to the enactments of material-discursive practice that are observed. To accomplish these goals I will trace networks (Latour 1999, p. 24), unpack material-discursive practices (Barad 2007, p. 54) and explore phenomena through a lens of human-technology relations (Ihde 1990). Through this enquiry, I seek to gain a deep understanding of how the phenomenon of 'leadership' is produced in enactments with computational object. In particular, I view agential realism as having a central role here in this theorising as it frames 'leadership' as a materially-discursive phenomenon that can only be understood in relation to various practices and arrangements of apparatuses. By following this approach, I seek to make a contribution to the leadership-as-practice (LAP) literature by applying agential realism in the study of leadership, including computational objects as actants in the production of LAP, and thereby extending the boundaries of this stream of research in significant ways. However, in order to accomplish this, I must mobilise a coherent methodological approach.

Therefore, in the next chapter, in order to refine the research topic, questions, and ways to approach them, I turn to the details of the methodology deployed in this study as well as providing details of the cases presented within this body of work.

Chapter 3

Methodology

Measurements are agential practices, which are not simply revelatory but performative: they help constitute and are a constitutive part of what is being measured. In other words, measurements are intra-actions (not interactions): the agencies of observation are inseparable from that which is observed. Measurements are world-making: matter and meaning do not pre-exist, but rather are co-constituted via measurement intra-actions [...] Measurements are material-discursive practices of mattering (Barad 2012a, pp. 6-7).

IN THIS CHAPTER, I OFFER THE READER an account of my methodological choices by outlining those employed in this study. As indicated by the epigraph above, I take these choices and the enactment of the research itself as a ‘world-making’ activity that produces differences that matter. This chapter serves to disclose as much of this understanding as possible. The order of the chapter is as follows: First I discuss the underlying strategy of my choice of methodology (section 3.1) as well as the approach and its limitations (section 3.1.1). I then discuss two overarching methodological choices, reflexivity and diffraction (section 3.1.2). After this, I furnish specific details about data collection (section 3.1.3), and data analysis and interpretation (section 3.1.4). These are followed by ethical considerations (section 3.2). The chapter concludes with information about the sites and informants (section 3.3).

3.1 Methods (and Madness)

Despite my overall optimism in suggesting the potential benefits of an ethnographic study that features observational fieldwork, it is no secret that this is an approach fraught with difficulties. Van Maanen and Kolb, for example, locate this difficulty in the interpretive act of giving voice, not to the researcher’s understanding, but ‘of those that populate the

studied places and times' (1982, p. 6). Czarniawska points to the potential emotional stress of fieldwork (2007, p. 53), while Atkinson and Hammersley point to arduous conditions at virtually every front, including research design, site access, ongoing field relations, interviewing, recording and organising data, analysis, writing, and ethics (2007, p. vii). They tell us succinctly:

[F]ieldwork is a very demanding activity, and the processing of data is equally time-consuming (*ibid.*, p. 160).

This, however, is not to suggest that other methodological approaches are without difficulty. Rather, it is to surface the inherent difficulties of the methodological approach I have selected.

In sum, an ethnographic approach involves methods that can be likened unto a form of what Heath calls 'madness' (1993, p. 256). Given these preconditions, I offer the reader to an account of how I managed both these methods and their attendant 'madness'.

3.1.1 Research Approach and Limitations

The approach I have adopted is shaped by calls from a body of scholars to undertake research exploring the role of technology and leadership through a qualitative approach (Avolio, Kahai et al. 2000; Avolio, Walumbwa et al. 2009; Gronn 2002). As a poorly understood area (Lowe and Gardner 2001), the study of the relation between leadership practices and computational objects aligns with a 'nascent archetype' (Edmondson and McManus 2007, p. 1158), which is driven through open-ended research questions, qualitative data, interviews, and observations, leading towards a suggestive theory (*ibid.*, p. 1160) that includes the role of computational objects in leadership practice. Further, following the guidance of Nicolini, I take a 'toolkit approach' (2012, p. 213) towards methods, allowing for a dialectic of 'zooming in and zooming out' (*ibid.*, pp. 219-239) between theory and data, where I allow for a 'switching between theoretical lenses' (*ibid.*, p. 213) based on an iterative, interpretive model.

As a study designed to understand human behaviour and practice, it follows an ethnographic tradition. Here, Van Maanen observes:

[F]ieldwork is one answer—some say the best—to the question of how the understanding of others, close or distant, is achieved (1988, p. 2).

Consequently, the research methodology I have selected for the study draws on the interpretive paradigm, and as such, seeks to make visible in the mundane what is often taken for granted (Suchman 1995).

The study therefore carries the responsibilities and limitations of employing the researcher as an instrument (Van Maanen 1988, p. 14) that, like all humans, can only ‘see the world through the forms we construct to grasp it’ (Taylor 1989, p. 472). Following Czarniawska, I claim not that the methodology I have assembled is the ‘right approach to field studies in modern societies; I do claim, however, to have joined the search for such approaches’ (2007, p. 17).

It is also important to understand that the sites studied in this research were self-selecting and this willingness to allow a researcher to observe normally hidden details of their work may be a form of selection bias. In contrast to organisations where I was ultimately given access, there were also cases where I was initially given a positive indication, but ultimately declined. Outside the organisations I was granted access to, the findings in this study may not apply. This is an important limitation of the study and its methodological approach. For more on site selection and access, see section 3.1.3.1.

3.1.2 Reflexivity and Diffraction

The concept of reflexivity has, for many qualitative researchers, become *de rigueur* as a means to reduce bias (Becker 1967), to focus attention on the components of practice (Llewellyn and Spence 2010, p. 1421), or to clarify ‘taken-for-granted assumptions and blind spots’ (Alvesson and Skoldberg 2009, p. 9). In my own thinking, I have tended to associate reflexivity with Alvesson and Kärreman’s description of it, where it is seen as part of an apparatus:

[T]hat encourages alternative constructions and the self-critical interpretations of one’s own paradigmatic, political, theoretical, methodological, and social predispositions (Alvesson and Kärreman 2007, p. 1269).

Reflexivity is also associated with sceptical constructivism, an anti-essentialist stance that brings together relativism, constructivism, and reflexivity as its primary elements (Grint and Woolgar 1997, p. 5). Thus, like the term *leadership*,¹ *reflexivity* means different things to different people in different contexts.

Woolgar offers a spectrum of possible reflexivities, ranging from *radical constitutive reflexivity* to *benign introspection* (1988, p. 21). He describes the former as being closely linked to Garfinkel’s (1986) ethnomethodological programme with the suggestion that:

[I]n any act of representation, there is an intimate interdependence between the surface appearance (document) and the associated underlying reality (object) (Woolgar 1988, p. 21).

¹See section 2.2.2.1 for a discussion of various meanings of leadership found in the literature.

As concerns the latter ‘reality’, Woolgar contends that reflexivity entails loose injunctions to ‘think about what we are doing’ (1988, p. 22). Thus on one end of Woolgar’s spectrum, *radical constitutive reflexivity* calls us to learn to see through surfaces to an ‘underlying’ reality, whereas, at the other end of the spectrum, *benign introspection* calls us to critically look upon ourselves. Offering a possible explanation for this range of understandings, Woolgar further suggests this:

[V]ariation in reactions to reflexivity is also indicative of tensions at the heart of social science over the relationship between observation (image), observer and observed (subject/object) (*ibid.*, p. 31).

Indeed, Barad confirms as part of these tensions, reflexivity has been trenchantly critiqued by a range of scholars on two key points. First, she claims that science studies have ignored ‘crucial social factors such as gender, race, class, sexuality, ethnicity, religion, and nationality’ (2007, p. 87). Moreover, she links this omission to a lack of appreciation of the ‘mutual constitution of the “social” and the “scientific”’ (*ibid.*), pointing out that the supposed distinction between these has been:

[C]hallenged vigorously on multiple grounds by feminist, poststructuralist, postcolonialist, queer, and other critical social theorists, and that attending to the issues they raise is an integral part of questioning the constitution of the nature-culture dichotomy and the work it does: not only *that* it matters, but *how* it matters and *for whom* (*ibid.*).

Second, according to Barad, reflexivity presupposes that what is represented *reflects* ‘(social or natural) reality’ (emphasis added, *ibid.*), directly challenging the Garfinkelian assumption of an ‘underlying’ reality in Woolgar’s *radical constitutive reflexivity*. In Barad’s view, such a position ignores the possibility that *practices* of representation may themselves impact the objects of investigation. It also suggests that reflexivity implicitly privileges itself with a quality of knowing that is somehow better/different than other forms of knowing. Pointing to a precondition this position implies, she argues that:

[R]epresentation raised to the n^{th} power does not disrupt the geometry that holds object and subject at a distance as the very condition for knowledge’s possibility (*ibid.*, p. 88).

In other words, Barad argues that knowledge *only* arises out of relations; knowledge *is* relational and arises *through* apparatuses of material-discursive practices (*ibid.*,

p. 146); and that it is an error to rely too heavily on reflexive knowledge.²

Thus, Barad argues for recognising the limitations of reflexivity as an optical metaphor that biases towards reflection and, in the words of Haraway, ‘only displaces the same elsewhere, setting up worries about copy and original and the search for the authentic and really real’ (1997, p. 16).

In response to these concerns, Barad offers *diffraction* as an alternative metaphor, based on patterns that are formed by wave energy as various waves additively combine. Such patterns are part of everyday life if one knows how to look for them. For example, in figure 3.1, an aerial photograph of the surface of the ocean displays various diffraction patterns as ocean waves combine, forming new patterns in the water as evidence of this *differential* process.

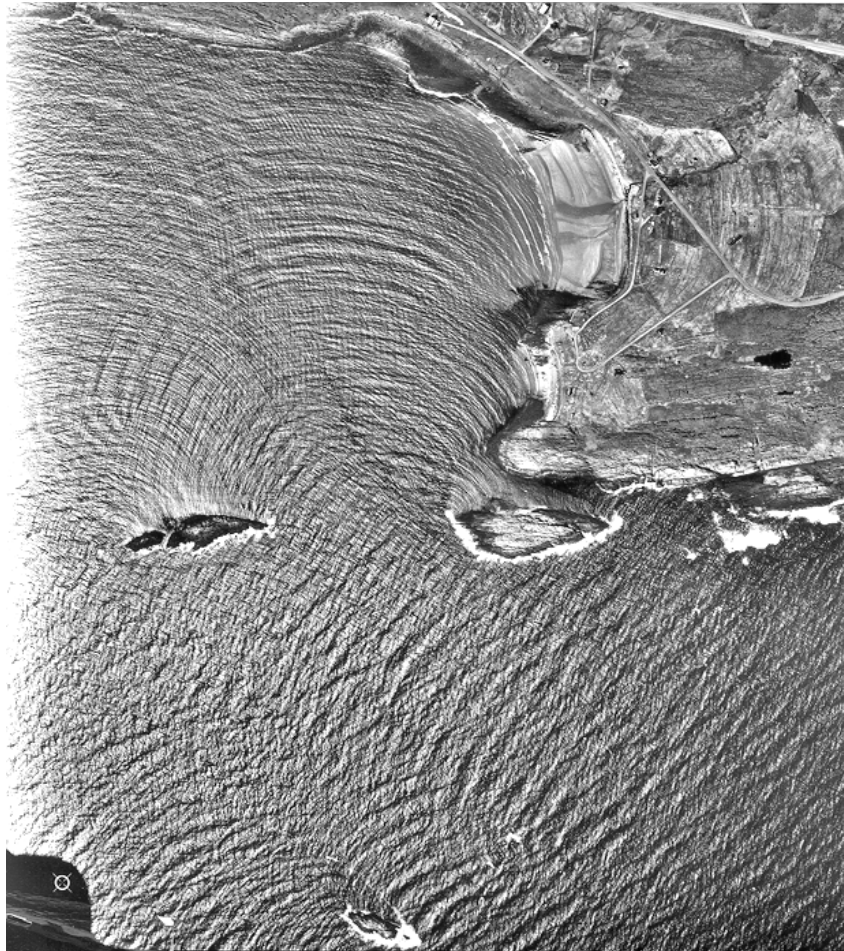


Figure 3.1: Diffraction Patterns on the Ocean Surface

²The reader may also observe that Barad includes in this argument a critique on *representationalism*; this argument turns on the point that what is represented does not necessarily *reflect* a ‘social’ or ‘natural’ reality (2007, p. 87), and is the basis for her alternative to representationalism: *performativity*.

According to Barad (2007), and Nicolini and Roe (2014), the metaphor of diffraction can also be extended methodologically. To approach one's research through a diffractive methodology means not fixing the identities of subjects and objects in advance (Barad 2007, p. 30), which enables the researcher to read 'insights through one another in ways that help illuminate differences as they emerge' (*ibid.*), including those from 'one area of study through another' (*ibid.*). Barad credits Haraway for the inspiration of this approach, however, Bateson also points towards similar concerns with his remark that:

[W]hat we mean by information—the elementary unit of information—is *a difference which makes a difference* (original italics, 1972 / Bateson 1987, p. 470).

Moreover, the methodological approach of diffraction is aligned with the toolkit approach (Nicolini 2012, p. 213) discussed in section 3.1.1 in its insistence to develop theory iteratively and dynamically. Given this study's reach across the HCI, IS, OS, and leadership literatures, diffraction provides a crucial methodological support for establishing linkages among them.

Prior to reading Barad (2007), I had not considered how the optical metaphor of the term *reflexivity* might influence what I might do with it methodologically. Alvesson and Kärreman's (2007) formulation falls more towards Woolgar's *radical constitutive reflexivity* (1988, p. 21), so it may not generate insights that are reflective in the way Barad argues against. However, irrespective of whether reflexivity has made a useful difference in my past thinking or not, Barad makes an important point, one that helps to more carefully direct the researcher's gaze to difference and understandings that can arise from identifying emergent relations.

Practically, reflexivity involves allowing time to think and reflect on ideas and allowing that thought process to surface unquestioned assumptions. Diffraction, however, involves actively trying out different combinations, for example, linking data to extant theory and then assembling various theoretical perspectives from a range of disciplines which appear to describe the same phenomenon. Simply put, diffraction is methodologically employed as a means for drawing new distinctions through extant data. This diffraction method is employed in the analyses carried out in each of the three empirical chapters 4, 5, and 6. The results of these are then further reflected upon and diffracted in the final chapter 7.

In conclusion, reflexivity, within this study, invokes sceptical constructivism, includes questioning assumptions, the generation of multiple explanations for the phenomena of interest, and attention towards the various cultural frames through which I see. All of this is useful, but so is being attentive to diffraction; that is, noticing difference and attempting to understand how difference comes into being.

Throughout this study, both reflexivity and diffraction are constant companions in my thinking as methodological anchors. For this reason, I take the reflexive position that my physical presence and thinking are themselves important apparatuses that shape this work in particular ways, hopefully enabling me to see through ‘surfaces’ towards what may lie ‘underneath’, to look critically upon myself as an instrument of research, and to be more aware of my own blind spots. Moreover, I take the diffractive position by not assuming that the objects of human and computational object are fixed in enactments of leadership practice, by paying close attention to differences (both empirical and those found in the literature), overlaying them, and reading them through one another, feasibly generating novel insights on this basis.

3.1.3 Data Collection

Within this section, I describe the data collection methods I have employed in the study. The majority of the empirical data collected for the study has been derived through observational fieldwork with organisations at their offices in London and Silicon Valley. These observations were primarily based on shadowing (Czarniawska 2007; Nicolini 2012) formal leaders and ‘tracing the associations between human and non-human elements and studying the effects that the resulting arrangements make in the world’ (Nicolini 2010, p. 1394). The research is further enriched by extensive interviews (Whyte and Whyte 1984, pp. 97-111; Alvesson 2011a) as well as a variety of virtual methods (Boellstorff et al. 2012). Through this array of data collection methods, the research provides a grounded empirical base from which analysis of processual relations between leadership practices and computational objects can be undertaken.

3.1.3.1 Sites and Access

At various points in my professional career, I have been involved with business sales operations, where the notion of keeping a *sales pipeline* filled is crucial to the ongoing goal of accomplishing sales (Cefkin 2007). For this reason, when I made the decision to conduct observation in this study, I also identified the negotiation of access as isomorphic to the process of managing a sales pipeline. I therefore began cultivating ‘prospects’, that is, potential informants (and their sites) three months into my doctoral programme. Having an established career in industry and a well-established professional network to tap into perhaps made this challenging process somewhat easier. Even so, granting permission to see what is happening in a company for weeks or months on end is something that many companies simply decline.

For this reason, site selection and the negotiation of access was viewed as concom-

itant in this study, where site selection tends to occur towards the beginning of a study and access is part of an ongoing, relational process that continues throughout (Feldman et al. 2004, p. x). The former was informed by Zuboff's primary site selection criterion: that potential sites must demonstrate interest in 'learn[ing] something from the new knowledge that would be produced' (1988, p. 425) by the study. I took such a demonstration to be a tangible expression of how the research fits into the potential site's strategic goals or human resource learning and development plans. I found with some surprise that Zuboff's criterion supported consistent development of a mutually productive relationship between researcher and organisation.³ Additional criteria for selection included the following:

1. Global organisations;
2. Sites where new projects, tasks, management, teams, or systems are being deployed are preferred—these align with the research questions that point towards what is new and different and help identify environments where leadership practice has undergone, or is going through, practical change.

To identify sites, I undertook as a preliminary step a set of interviews aimed to develop sensitising concepts, providing a 'general sense of reference and guidelines in approaching empirical instances' (Blumer 1954, p. 7). These are described in section 3.1.3.3.

To identify potential informants, I began enlisting professional colleagues in my personal network for support and introductions to their colleagues. Through this practice I was able to identify and conduct a series of interviews with senior executives, ranging from senior vice-presidents to C-level executives across a wide range of global organisations including government, internet and technology, management consulting, manufacturing, media and broadcasting, public relations, retail, and venture capital.

Viewing access as a relational process helped me to keep access in mind when interacting with anyone. Thus, when an interviewee expressed interest in the research at the end of an interview, or asked how else they might participate, I took this as a match for Zuboff's criterion and continued discussions with them on the possibility of observation. Access, then, was produced in part through my ongoing persistence and focus on developing relationships with others (Daniel-Echols 2004, pp. 106-109). I describe additional empirical details of site selection in section 3.1.3.3 on page 95.

Through the access I was granted, irrespective of what I was allowed to see and what I was not allowed to see, how this varied across sites, and how, even in cases where

³I took such a criterion as a licence to care about and engage with the goals that the potential sites shared with me. After nine interviews, I had received two unsolicited requests from informants that their site be included in the observational phase of the study. I took this as evidence that Zuboff's method was indeed effective.

the broadest access was allowed, limits of all sorts were present. The idea therefore was not to see everything, but within the contexts I was given access, to be faithful to an ethnographic sensibility and attend to the mundane, the overlooked, and the details of habituated practice (Alvesson and Sveningsson 2003b; Chia and MacKay 2007; Star 1999).

With some companies, I was also required to sign a non-disclosure agreement as a pre-condition for access. In these cases, I reviewed and suggested modifications to the non-disclosure agreement that defined the scope of my research project and explicitly listed research outputs as objects for which I was granted the right of publication with the provision that these would be provided to the site for review before publishing. Here, review was a courtesy; these agreements granted the hosting organisation no editorial rights. These modifications were accepted in all cases.

In some organisations, I was permitted only to conduct cursory interviews, while in others, I was granted much broader access to their physical premises and permitted to observe in a variety of organisational settings in the form of *shadowing* (Czarniawska 2007), where the researcher follows the informant in the enactment of their practices. Through shadowed activities, I observed, among others, client presentations, collaborative work sessions, company events, individual work sessions, interviews, meetings, telephone calls, and shared meals *in situ*. I describe this in detail in section 3.1.3.2.

Not everything, however, went according to plan. For example, I had a site set up for observation with the US military for April 2013 and had arranged my travel and accommodations for this field visit. Then, just a few weeks before it was scheduled to begin, the informant contacted me and said that his commander's commander, the officer in charge of the base, did not want any researchers on site and was blocking approval, although I had previously been told approval was granted. The informant was extremely apologetic and attributed this decision to the base commander's impending retirement coupled with political aspirations (Interview 1011, 17 April 2013). Fortunately, I had also set up site observations at another site in the same city, and so was able to recover from this change in plans without much disruption.

The next three sections describe further details of the methods deployed whilst in the field.

3.1.3.2 Observation, Shadowing, and Fieldnotes

Forms of fieldwork that involve direct observation are intrinsic to ethnographic study (Silverman 2011, pp. 113-160; Van Maanen 1988, p. 48). However, the particular variant of *shadowing* is a methodological approach which McDonald claims is generally 'neither discussed as a distinct research method nor examined methodologically' (2005, p. 455). In one of the few detailed definitions found in the literature, McDonald defines shadowing

as:

[A] research technique which involves a researcher closely following a member of an organization over an extended period of time. When the person being shadowed goes to another department, the researcher follows them. When they have a project meeting or meet with a customer, the researcher sits in. If they have coffee with friends who are colleagues from another site, the researcher goes too. The researcher ‘shadows’ the target individual from the moment they begin their working day until they leave for home. This can include hours of stationary observation while the person being shadowed writes at his or her desk, running between buildings for a series of meetings or attending dinners held for clients. Shadowing activity will be as various and complex as the job of the individual the shadower is investigating. Shadowing can be done over consecutive or non-consecutive days for anything from a single day or shift up to a whole month. Studies can be focused on a single role (such as new recruit or purchasing manager) in several companies or on a number of roles within the same company (2005, p. 456).

I offer this lengthy quote because it describes the method of shadowing in a way that actually describes key details of what is involved. These include the aspect of following a person throughout their daily work as a ‘shadow’. Here, the researcher immerses herself in the context of the informant, seen from a vantage point that is proximal to the informant. In contrast to McDonald, Nicolini defines the method much more succinctly, as:

[F]ollowing people, wherever they are, whatever they are doing (2012, p. 302).

This quote, like McDonald’s, tells us what the researcher does when shadowing, but omits much of the detail that may be useful to someone unfamiliar with the concept. Once acquainted with the idea, however, Nicolini’s description becomes a useful handle to what makes the method stand apart from other observational approaches.

According to Czarniawska, the distinctive approach of shadowing also offers unique empirical opportunities for

[A] mutual observation, an establishing of similarities and differences; then there is a focus created by the movements of the person shadowed, and the double perception as it were—the researcher guesses (and asks about) perceptions of the events being perceived as well [...] The bonus lies in the extra self-knowledge that the researchers can gain. The main compensation is a

problematized picture of social reality that carries the possibility of liberation for those who suffer from the reality they were led to construct, and a promise of a non-trivial story for the researcher (2007, p. 56).

The ‘bonus’ Czarniawska describes is a phenomenon I can personally attest to; I did find myself asking my informants about what they were doing and was surprised in many cases to find that the answer was ‘I never thought about that before’ (field diary 13 November 2012), a response that stands in direct opposition to how people in leadership positions are normally thought to operate. Thus, shadowing has a way of revealing aspects of practice related to an individual and their relationship to the world that is particularly focused and which may not come to the fore through other methodological approaches.

In this way, Nicolini reports that through shadowing, the researcher is able to

[A]ttain an insider’s view of the patterns of relationship, the different perspectives among co-participants—who is who and who knows what—the interests at stake, and how these different perspectives, usually sustained by specific discourses, are worked together, aligned, or played against each other, so creating differential power positions in the field. By the same token, researchers can also identify who occupies the different positions made available by the activity, and appreciate the expectations and privileges that come with them (2012, p. 222).

Shadowing, in my use of the method, offered precisely this kind of ‘insider’ information, and thus enabled me to effectively follow Alvesson’s strategy of *situational focus* (1996, pp. 201-206), where the researcher employs the knowledge gained through immersion in the context to be able to discern precisely what possible areas for further observation may ‘reflect[s] significant elements of organizational life’ (*ibid.*, p. 201) within the site.

Moreover, according to Nicolini, shadowing does not have to include only people, but can also include objects:

The investigation can follow a compositional or decompositional strategy: following the actors can thus literally mean shadowing human or non-humans actors, and observing their daily activity of weaving connections (Czarniawska 2007), or alternatively, it may mean retracing the steps, strategies, and events that led to the emergence, stabilization or failure of specific assemblages using historical methods (Latour 2005). My tenet here, based on the principle that practice theory and actor-network theory also share a number of family resemblances, is that these concepts and methodological recom-

mendations can be equally employed to investigate the connectedness of practices (Nicolini 2012, pp. 231-232).

Thus, in my shadowing of an office director ‘doing email’, I not only paid attention to what the human did, but also to what the computational object did and the particular ways engagements between the human and the computational object occurred. This included, for example, noting the enabling and constraining aspects of the software that was invoked through the computational object. How, for instance, was the email system being utilised? Were labels⁴ involved? Did the user archive⁵ their mail? How did they search for mail? Did they use instant messaging (IM) in tandem with email? Did their keyboard and mouse actions reveal an understanding of keyboard commands and features in a way that helped place the user’s level of fluency and comfort with the computational object? In other words, how did their actions describe their *relationship* (1984 / Turkle 2005, p. 1) with the given computational object?

In this manner, the shadowing of formal and informal leaders allowed me to traverse the network of people and objects through which ‘leadership’ was seen to have taken place by members. One of my tasks, then, was to account for *how* these assessments of leadership came into being *in practice*.

All observations were noted in an electronic field diary *in situ* and in real-time. These included taking verbatim notes on what was said and discussed and by whom, as well as on the overall setting and atmosphere, the way people were seated, and other non-verbal clues.

Then, at the end of a day of shadowing, I would leave the site and return to my domicile to re-type the field notes, expanding as much as I could based on the notes made that day. In the majority of cases, I would then send the notes back to the informant for them to review with the possibility for them to offer additional feedback. In some cases this occurred after initial coding had occurred (see section 3.1.4). This practice led, in every case, to greater trust offered to me by the informant. Moreover, there were cases where my providing them my notes prompted them to show me particular things on the next shadowing occasion because they then better understood what I saw as interesting in their practice.

A total of 30 days of shadowing were conducted over a 15-month period from October 2012 through December 2013. This was across three different companies and focused on 14 distinctive informants in total. A complete listing of shadowing activities are detailed in appendix D.

⁴For more information on labelling email, see <https://support.google.com/mail/answer/118708>.

⁵For more information on archiving email, see <https://support.google.com/mail/answer/6576>.

To further broaden and enrich the data collection, interviews were also conducted, as described below.

3.1.3.3 Interviews

While interviewing is a ubiquitous data collection method across a broad range of research, like all methods, it presents a number of potential pitfalls (Potter and Hepburn 2005, p. 300). These issues arise, according to Fontana and Frey, because interviewing is:

[I]nextricably and unavoidably historically, politically, and contextually bound. This boundedness refutes the whole tradition of the interview of gathering objective data to be used neutrally for scientific purposes (2005, p. 695).

Thus for Fontana and Frey, not only are there potential problems with the interview itself, it is also fundamentally flawed if conceived as a means to ‘neutrally’ gather data. Alvesson summarises this problem rather neatly by characterising:

[T]he interview as a complex social situation [that] may bear the imprints of a multitude of social logics, mechanisms or social forces that need to be theorized and assessed [...] A key question is how this can be handled (2011a, p. 75).

His answer to this question has been helpful to my consideration of interviews (and other forms of engagement with informants) in this study. Through eight metaphors, each of which presents a ‘central problem’ (*ibid.*) for the research(er) to ‘solve’ (*ibid.*), rendered as table 3.1, I have attempted to be aware of and address these in various ways.

Alvesson maps out three paradigmatic responses to each of these metaphors, based on a tripartite schema of *neo-positivism*, *romanticism*, and *localism*.⁶ The first, *neo-positivism*, corresponds to a view that is in search of a ‘context-free truth about what is really “out there”’ (Alvesson 2011a, p. 11). *Romanticism* denotes a position that wants to come closer to the respondent to capture the ‘real self’ (*ibid.*, pp. 13-14). And the third, *localism* ‘emphasizes that interview statements must be seen in their local situation-specific context’ (*ibid.*, p. 19). Of these three, the present study aligns most closely with the third paradigm.

Using these three paradigmatic positions, Alvesson fleshes out a range of responses to the problem of interviewing. Ultimately, what he argues is that there is no correct answer. What is key, however, according to Alvesson, is that the paradigm from which one views the problem inherently shapes a range of possible responses and limitations. On

⁶This structure corresponds to Silverman’s use of *positivism*, *emotionalism*, and *constructivism* (2011, pp. 170-185) in the same context.

Metaphor/Central Problem	
❶	Local accomplishment: The social problem of coping with an interpersonal relation and complex interaction in a non-routine situation;
❷	Establishing and perpetuating a storyline: The cognitive problem of finding out what it is all about (beyond the level of the espoused);
❸	Identity work: The identity problem of adapting a self-position which is contextually relevant (and / or comfortable for the interviewee (see also Bamberg 2011);
❹	Cultural script application: The ‘institutional’ problem of adapting to normative pressure and cognitive uncertainty through mimicking standard forms of expression;
❺	Moral storytelling: The problem (or option) of maintaining and increasing self-esteem that emerges in any situation involving examination and calling for a performance (or allowing esteem-enhancement to flourish in the situation);
❻	Political action: The motivation problem of developing an interest or rationale for active participation in the interview;
❼	Construction work: The representation / construction problem of how to account for complex phenomena through language;
❽	A play of the powers of discourse: The ‘autonomy / determinism’ ‘problem’ of a powerful macro-discourse operating behind and on the interview subject.

Table 3.1: Eight Metaphors as Central Problems in Interviews (adapted from Alvesson 2011a, p. 76)

this reading, interviews are then ‘the conceptual articulation of pre-theoretical Weltanschauung that are inextricably related to the historical, psychological, and cultural conditions of individual’ (Staiti 2013, p. 34).

Given this instability within the interview, I am comforted by Czarniawska’s assertion that:

It is impossible to imagine an entire organization staging a coherent performance for the benefit of one researcher (2007, p. 80).

Czarniawska’s insight suggests that with *systematic application* of method, many concerns around it can be ameliorated. Given these limitations, and following Byrne, I view interviews as extremely useful:

[F]or accessing individuals’ attitudes and values—things that cannot necessarily be observed or accommodated in a formal questionnaire (Byrne cited in Silverman 2011, p. 167).

Another useful way of putting this is that interviews are a way of collecting and enabling the rigorous examination of narrative accounts of social worlds (Miller and Gassner 2004, p. 137). Within this study, interviews were thus deployed as support to

direct observation in this study, often as a means to compare (Ragin 1989) what is said (in an interview) to what is observed *in situ*, highlighting concordances and dissonances between idealisation (Taylor 2004, p. 23) and observed practice. Comprehensively, a grand total of 59 interviews across 19 companies and 44 informants were conducted as part of this study. These are enumerated in appendix E.

Sensitising Interviews However, before ever setting foot in the field, I began by drawing on Blumer's notion of the *sensitising concept* (1969, p. 148) with what I refer to as *sensitising interviews*. These interviews, which preceded fieldwork, helped to develop an understanding based on empirical data of what might be important to look at with respect to leadership practices and computational objects in the field. In undertaking these sensitising interviews, an important set of assumptions I adopted, following Sproull et al., is that computing can be interpreted as a culture (1984, p. 46), and, by my own extension, that leadership could also be fruitfully explored in this fashion. That is to say, I wondered diffractively, if practices of *both* computing and leadership were:

[I]nfluenced by the social order surrounding computing [and leadership]: by the attitudes and behaviors of people who are good at it, by the management of computing [and leadership] resources, and by the general perceived importance of computing [and leadership] in society and the organization (*ibid.*).

Based on this speculation, I constructed thematic questions for an open-ended interview (Alvesson 2011a, p. 79) to explore these general topic areas. These were the following:

1. How the informant came to be conscious of the concept of leadership and a chronological history of the development of this concept in their experience, including key milestones in their experience of how they became a 'leader';
2. How the informant came to be aware of computational technology and a chronological history of how this awareness was embodied in their experience;
3. A discussion of the key practices that, in their view, constitute their leadership practice.

These interviews began before I initiated any fieldwork and lasted between a 30 and 90 minutes. I conducted a total of 33 such interviews with senior executives from a broad range of companies in Europe and the US, across a wide variety of sectors, including broadcast media, consumer products, computer hardware manufacture, computer software development, government/military, insurance, management consulting, public

relations, retail, and venture capital. These were conducted with informants categorised as leaders based on a title at C-level, Director, Principal, Vice-President, or a military title greater than sergeant. This categorisation implicitly reproduces Grint's notion of leader understood as *position* (see figure 2.3 on page 29) but can be seen as the researcher engaging with/drawing on the citationality of leadership arising from this category, as a case of gathering data from those who have experienced such roles, or both. To further enhance this, I also undertook similar sensitising interviews with managers, executive assistants (EAs), and non-managerial persons who may be seen as a follower, or perhaps, an informal leader. The purpose of these interviews, in keeping with Blumer's perspective, was to provide an empirical basis that would 'suggest directions along which to look' and provide an empirical basis for a 'general sense of what is relevant' (1969, p. 148). These sensitising interviews, along with all others, are enumerated in appendix E.

While conducting these interviews, the discussion of leadership would evoke responses that touched on technology and/or leadership practices such that a topic would not need to be evoked explicitly but came up as a matter of course.

These sensitising interviews also served as a means to introduce this research to the informants and as an initial step towards including their organisation as an observational site in the study. Thus, some of these informants were later observed and participated in multiple sequential interviews, enabling the researcher to 'correct earlier errors and omissions and to construct a denser, more complex analysis' (Charmaz 2003, p. 318). A number of important themes emerged in these early interviews which shaped my site selection within the study.

The Choice to Emphasise Technology Companies Going into the study, my thinking had been that based on my existing experience in internet and technology companies, while I presumed such organisations would be potentially useful sites, a less biased choice might be to observe sites *not* in an area where I already had a great deal of familiarity. However, once I began analysing the narratives (Silverman 2011, p. 91) of the sensitising interviews, a pattern emerged that changed my mind.

In particular, I found a consistent pattern in the narratives of early interviews around material differences in leadership practices between organisations describing high levels of technological engagement compared to organisations with moderate levels of technological engagement. This pattern split such that the leaders at internet and technology companies fell into the 'higher engagement' camp while the non-technology companies more often fell into the lower levels of engagement, often actively resistant.

The companies with narratives of lower engagement and higher resistance often conveyed these in stories of (often compounded) errors in data leading to a mistrust of the

system (Interview 1002, 23 Jan 2013; Interview 1005, 26 Mar 2012) or the position that ‘our systems don’t talk to each other’ (Interview 1002, 23 Jan 2013).

In contrast, many of the technology companies conveyed quite a different set of narratives, about technology being positively ‘embedded’ in their daily experience (Interview 1012, 17 May 2012), about a willingness to try new things with computational systems (Interview 1009, 06 Apr 2012) and, perhaps, most importantly, an ability to competently enact evolutionary changes to systems as learning occurred (Interview 1004, 28 Mar 2012).

Based on this pattern, I focused observations more towards the internet and technology companies as a likely location for the invention of novel leadership practices enacted through computational objects. Given that, even in environments where such innovation might be present, there would likely be problems as well, I reversed my previous decision and focused on securing internet and technology companies as sites.

In summary, I saw interviews as an example of what Yanow et. al refer to as ‘talking to people’ (2012, p. 351), and thus, while the questions above provide thematic structure to the conversations, I allowed flexibility in following ‘departures from the initial area of interest’ (Alvesson 2011a, p. 9).

Recording and Transcription Each interview was recorded and then fully transcribed. During the spring of 2012, I had several interviews scheduled very close together and began to have difficulty keeping up with the transcriptions. To alleviate this as a potential block in my workflow, I engaged a transcription company I had worked with previously and knew to provide high-quality transcriptions based on my requirements. More specifically, the transcription company signed a non-disclosure agreement with me for all transcription work and provided me with time-code information within each transcript so that when I reviewed the files, if any errors were present, I was then able to easily locate these in the original recording and ensure each transcript was accurate as possible.

Following transcription, I reviewed each transcript for errors, making corrections where necessary, and added these to NVivo™ for pattern-coding (Miles and Huberman 1994b, p. 69). The coding process is described in greater detail in section 3.1.4 below.

3.1.3.4 Virtual, Electronic, and Archival Data

In a modern organisation, Barley and Kunda argue that purely observational methods are insufficient by raising the question of:

[H]ow to study work that entails few physical or interpersonal acts, or work whose physical traces are ephemeral. Consider, for instance, the act of working on a computer, where traces of activity appear and disappear in a matter of

seconds. Traditional forms of observation are inadequate for such situations simply because events happen too quickly for observers to register and record. Because there is reason to believe that a significant portion of post-industrial work is computer mediated, researchers may need to devise and adopt ways of augmenting their observational capacities via technological means (2001, p. 85).

Thus, Barley and Kunda flag the critical issue of how to observe practices in environments where the practices of interest are not necessarily visible through physical presence.

In response to such concerns, I sought out and was granted additional access at some of my sites to computational data sources which provided access to a material-discursive record of a particular virtual space (Boellstorff et al. 2012, pp. 118-120). I also found that through publically available social media systems (Minocha and Petre 2012, pp. 41-50), some of my informants engaged with one another in ways that produced analogues of face-to-face engagements. And finally, through being granted limited permissions at some sites to record audio and video (Heath et al. 2010, pp. 15-17), I was able to record engagements with and between people and computational objects in a way that made visible many aspects of practice that would not have been observable through traditional approaches.

In addition to these, the following data sources were actively tapped in a variety of forms throughout the data collection process:

1. BoardEx™
2. Company Documents (as access was granted)
3. DataMonitor360™
4. Facebook™
5. GooglePlus™
6. LinkedIn™
7. Twitter™

As with other forms of data, these were also ingested into NVivo™ and coded per transcribed data.

3.1.4 Episode Selection, Data Analysis, and Interpretation

Using a ‘within family’ (Barley and Kunda 2001, pp. 85-86) comparative design, the empirical data generated from the fieldwork was then analysed to highlight the relationships between leadership practices and their outcomes, noting also where and how computational objects play significant roles. To accomplish this, a critical case study approach was mobilised where particular attention was paid to data where outliers and novel practices emerged, as these are understood to support the generation of new theory (Flyvbjerg 2011, p. 307). The aim of such an approach is to delineate a territory not well understood (Kahai 2012, p. 102; Eisenhardt 1989, p. 532).

The methodology employed for coding empirical material was initially Miles and Huberman’s pattern-coding, an approach that ‘pull[s] together a lot of material into more meaningful and parsimonious units of analysis’ (1994a, p. 69). Drawing also on their contact summary form (*ibid.*, p. 54), interviews were also tagged with pertinent metadata in order to further facilitate selective analysis. Once this stage had been reached, five key themes were abstracted from the data as follows:

1. *Various Modes of Dealing with (Computational) Interruption—from Freezing up to Improvisation:* In a number of observations at which I was present, various factors interrupt computationally enacted communication between formal leaders. These include power outages, network failures, and system crashes. As a communication technology, computers allow people to cross boundaries of time and space, but this comes at a cost of brittleness for those connections it enables. The tension between what technology enables (the ability to transcend boundaries of time and space) and what it constrains (a connection that could drop at any moment) is ongoing in the engagements I observed. Crucially, the way that different people respond to the brittleness is different, even within the same organisation. In my observations, I have seen some leaders respond by freezing up; taking up to 15 minutes to develop a clear plan of action after a disconnection. This is contrasted with the other extreme, where I observed a formal leader on a Skype™ call in the middle of a PowerPoint™ presentation when his computer crashed. Within 15 seconds, he had dialled up the other party through his mobile phone, carrying on as if nothing untoward had happened.
2. *The Practice of Pair Programming as Decision-Making and Resource Allocation:* In a number of my observations, I was able to observe pairs of programmers doing their work of solving engineering problems by writing programmatic code. In all cases, at least one of the members of the dyad was considered a formal team leader at a given point in time. There were a number of very interesting aspects to what I

observed here, including the high level of conversation between the pair, where the member ‘driving’ (typing) exhibits the practice of stating their thoughts out loud as they type and the other may respond to these thoughts, critiquing them, or offering a different approach. It was fascinating to observe what is considered to be such a technical practice as an ongoing and externalised conversation.

Within pair programming I found a repeatable practice of externalising thought and turning what normally happens inside one person’s head into a conversation or on-going debate in which joint decisions are made. These in turn result in lines of code that are written and committed as resources in a code base. Many definitions of leadership link practices of decision-making (Useem 2010a) and resource allocation (Yukl 2009, pp. 8-9), so what I found of greatest interest here is that under these definitions from the literature, what I observed meets established criteria for ‘leadership’. However, in my observations, this ‘leadership’ is distributed between two people (the pair), as well as a larger computational system of source control, build verification, and code reviews.

3. *Pair Emailing versus Emailing Alone at Night*: Following the notion of pair programming, at one of my sites I shadowed a chief operating officer (COO) and his executive assistant (EA) at length and was fascinated by their approach to the COO’s email. On the surface, the interesting factor was the COO’s strategy of a ‘zero inbox’ (Mann 2006), where the working information strategy is defined as having zero emails in one’s inbox, and thus, no communication backlog. However, as I observed this practice in depth, I found that the COO and EA had developed, over the course of nine months, a particular way of working together that in many ways mirrored the pair programming environment, with the EA coming into the COO’s office with her computer several times per week for at least one hour and sometimes for more than two, and the two of them sitting side-by-side working on the COO’s inbox and pending draft emails. However, with the COO and EA, instead of discussing code, they discussed emails: how to respond to them, what details were needed, sometimes with the EA taking this information and crafting a response *in situ* while the COO continued working on another inbox item. Many of these emails were company-level announcements that involved the senior executive team, and thus, the EA showed me evidence of emails that were being sent to *her* instead of the COO from members of the executive team who were in the early stages of crafting company-wide messages about policies, initiatives, and other decisions that had been taken but were ultimately intended to come from the COO. Thus, a distributed system of computational objects, senior executives, the EA, and the COO were ac-

tually producing many of the emails that are projected to the company as coming from the COO directly.

This stands in stark contrast to another chief executive officer (CEO) I interviewed who told me that she never did any email when she was at the workplace because she valued face-to-face engagements as a much more important indicator of what was really happening at the company. In explaining her position, she told me that:

I can't be sitting behind the computer getting every email returned immediately so I'm always trying to figure that [laughter] out but I spent all weekend this morning—all weekend—because I have probably three weeks of emails that I glance at them, I look at 'em, I take my iPhone™ out, is this urgent, you know? I mean I try triage the emails but I mean in terms of processing all of them, that doesn't really happen very much at the office. It happens on planes. It happens from home. It happens early in the morning, late at night so it still becomes a big part of how I do anything and all the reporting that I get so I would say I'm very involved in technology however it comes to me through other people, through how they do their work, you know, probably more so than just me as one individual (Interview 1005 26 March 2012).

For this CEO, a three-week backlog is her expected email queue and something that, despite the fact that her EA has access to her email, is something she thinks about in terms of personally giving her attention to. It is a solitary task, one that is practised in what I would call 'in-between' hours, such as weekends, mornings before work, on airplanes, and at home.

What is stark in this contrast are the choices and the underlying assumptions each executive has made about their email and the impact these choices have, not only on the individual, but on a range of agents and outcomes within the organisation.

4. (*Unconscious*) *Distancing in Remote Interviews*: I observed two pair programming interviews conducted by a formal leader for prospective employees. All of these were conducted by Skype™, which, in itself, is an interesting data point. Each interview had a similar flow with the following stages: 1) greeting and introduction 2) programming interview 3) discussion. What was interesting about these interviews is the way in which the interviewer employed various aspects of the audio, screen sharing, and video capabilities of Skype™ throughout the interview. Specifically, in stage one, the interviewer employed only audio, such that the interview was essentially equivalent to a phone call. During this stage, the interviewer would

introduce himself and then introduce what would be happening during the interview. In stage two, the interviewer shared his screen with the interviewee, so that in addition to the audio, the interviewee now saw the interviewer's screen, on which a development environment was displayed and which the interviewer typed but the interviewee was expected to engage in a pair programming conversation such that the interviewer would type for the pair. In stage 3, after the test, the interviewer stopped the screen sharing and shared his video, revealing his visual likeness for the first time. This was recapitulated by the interviewee.

I had presumed that the choices about what to reveal and when to reveal were deliberate on the part of the leader as a mechanism to create distance (Bligh and Riggio 2012a; Nardi and Whittaker 2002; Weisband 2008), however, on speaking with him further, he told me that he had not even thought about it. Moreover, on further questioning, this leader professed to know nothing about what has been uncovered in academic research regarding media richness theory and communication studies (Huang, Kahai et al. 2010; Kirkman et al. 2013; Stephens et al. 2008). These elisions suggest that such information may be something that is missing from contemporary leadership curriculum.

5. *Engaging Simultaneously in Multiple Communication Channels:* At all of my observations, formal leaders, informal leaders, and followers all exhibited a high level of engagement with a variety of communication channels. One of my informants, during shadowing tells me:

I use a lot of Yahoo™ Instant Messaging (YIM), email , *Mercury* [a proprietary social networking platform], face-to-face, and phone. Our team also implemented our own chat environment, *Iris* [a commercial social networking product], that they seem to like a lot (items in italics anonymised, Interview 1033 30 May 2013).

This range of communication channels is something each individual has to then monitor in terms of incoming messages, as well as making decisions about in terms of deciding which channel is appropriate for particular kinds of communication. This includes a number of nuanced uses of chat, email, document, and calendaring applications, often simultaneously as part of various kinds of conversations. A short extract from my field diary whilst shadowing a team leader who was commenting on a subordinate's code that was enacted through a computational system for code reviews, demonstrates the degree to which some of these communications are finely tuned:

Ellen appears to struggle to some degree with how to word her comment. ‘Don’t,’ she begins, and then erases that. Starting again, she writes ‘Shouldn’t,’ and then erases that too. On the third attempt, she writes ‘Wasn’t this doing the right thing initially?’ And then, having articulated her concern, she also adds a comment to the line above: ‘Maybe check the length too (not only a null check)’ (field diary 20 May 2013).

Examples like these show how Ellen goes to significant lengths to communicate her comments in a way that will be perceived as helpful by the recipient and not simply a criticism. She consistently makes suggestions to the author about what they might try, often including missing code or offering specific ideas.

I also found with a number of the formal leaders, whom I shadowed at a management level across a number of technology companies, that the practice of using index cards to track personal calendar or to-do items was very common, as evidenced in this field diary extract:

‘There is something about writing something down,’ he says, that makes it perceptually faster and easier in many contexts than using a computational device to log and manage the list. He tells me he also makes an index card with the schedule for the day and that the practice of writing this down and carrying the card has helped him remember important meetings (field diary 30 May 2013).

But the use of the index card does not stop here. It is also used as a rhetorical device in meetings, as evidenced in this field diary extract:

Tom [a subordinate] points out that ‘We do have an issue with the existing consulting staff. We also have an opportunity for messaging with new staff.’ What Tom is pointing to here is the distinction between existing staff who have already been given one message versus an opportunity to improve the messaging for future staff.

Connor [the leader] says something about dealing with this to avoid the phenomena of it ‘drop[ping] like a bomb at a standup.’ Here, he writes a note on one of his index cards (field diary 29 May 2015).

In this extract, the act of writing is a publicly visible event, one that rhetorically communicates to the participant that the leader has heard them and plans to take action in some way.

After assessing the analytical requirements of these themes, and also considering the maximum length for this dissertation as dictated by the University, I came to the conclusion that by selecting three of the five themes, I would be presenting an adequate coverage of the dynamics represented in each of the themes from a range of perspectives (Eisenhardt 1989, p. 538). Specifically, all of the themes located leadership within human and computational practices; however, some found it where there was no formal leader, some in traditional role relations, and others in the relation between a non-working computational object and a formal leader. The decision was then taken to present at least one case for each of these three distinctive perspectives for a total of three, and this is how the subject matter for the three empirical chapters 4, 5, and 6 were selected for inclusion in this study. The remaining themes will be developed in future work.

Subsequent analysis of these selected themes then proceeded informed by Alvesson and Kärreman's writings on creative theory development where they argue such an approach establishes a platform from which to offer solutions that go beyond critical questioning, providing a basis for the contribution of knowledge (2011). In keeping with the critical case study approach (Flyvbjerg 2011, p. 307), data were selected for each empirical chapter based on their interpretation as an outlier or novel practice in comparison to other data collected in the study. As regards the role of the data itself, they posit that 'empirical material may be mobilized as a critical dialogue partner—not a judge or a mirror—that problematizes a significant form of understanding, thus encouraging problematization and theoretical insights' (2011, p. 1266). For Alvesson and Kärreman, the development of theory is thus a highly disciplined, yet creative, process.

The next section addresses the ethical considerations taken into account in this study.

3.2 Ethical Considerations

Within agential realism:

[E]thicality is part of the fabric of the world; the call to respond and be responsible is part of what is. Questions of responsibility and accountability present themselves with every possibility; each moment is alive with different possibilities for the world's becoming and different reconfigurings of what may yet be possible. (2007, p. 182)

Framed in this fashion and echoing Adorno's epithet 'intelligence is a moral category' (1974 / 2005, p. 197), ethics cannot be decoupled from any enactment. According to

Barad, ethics permeates all aspects of the world, including the present research.⁷ Accordingly, within this research, ethics is not an afterthought but rather a primary methodological consideration that calls for accountability of my own views and for what the world might become through my actions. This consideration is perhaps foremost in my mind as I enact method through the ‘doing’ of research. Following Alvesson, I have therefore attempted to be attentive that:

[I]n practice there may always be complications and dilemmas and life, including research life, is full of ethical compromise. (2011a, p. 147)

The awareness that there is no perfect or absolutely correct way of enacting ethics in no way reduces my responsibility towards its consideration.

3.2.1 Anonymity and Trust

The data policy (see appendix F) for this project is based on the promise of anonymity to the individuals and companies participating in it. To this end, I briefed all potential informants about the research, its purpose, and how the data was to be used. In all cases, I verbally reviewed an informed consent form with them before asking if they had any questions or misgivings. If they did not, and indicated they still wished to proceed, I asked them to sign the informed consent before including them in the study.

All data was anonymised in terms of names, context, location, and, where appropriate, images, based on the UK Economic and Social Research Council (ESRC) guidelines (Clark 2006). Specifically, all organisations were given pseudonyms (from the Greek alphabet) and each informant was assigned a numeric four-digit code as a means of identifying them in either field notes or interviews. When writing field notes, real names were not used. A pseudonym name table was established for each organisation whereby each code was assigned a human-readable name that was not their own.

Additional steps have been taken to ensure that the promise of anonymity is honoured. These include redaction of company documents and the storage of all data on encrypted drives employing a multi-staged/multi-location backup system (also employing encrypted drives), to further secure the data (Sanjek 1990, p. 38).

As the nature of this study involves gaining and maintaining the trust of others (Feldman et al. 2004, pp. 35-36) to gain access to sensitive organisational data, I took this trust very seriously. The research led me into situations where I was granted access to informants’ private lives in some fashion that had no bearing whatsoever on the research. I therefore had to undergo some degree of discomfort when, in some situations, what I was

⁷A related point is made by Dourish regarding the implicit philosophy of computer science. 2001, p. vii–viii. While not foregrounded, it is there nonetheless.

there to see was their work practice but what I ended up seeing was, in my view, not meant for me or this research. I therefore took to the practice of not recording such observations in my field notes and when I felt it was important to do so, I would also tell my informant about such a decision. My experience is that such activities further engendered trust and generally positive relationships.

3.3 About the Sites

In this section, I offer the reader additional details on the sites profiled within this study and some additional information regarding the choices that were made to focus on particular kinds of organisations for study.

3.3.1 About Eta

[Eta](#) is the pseudonym for a global provider of agile software development and tools. The company maintains offices in the US and Europe. They hold an esteemed position based on a number of successful engagements with high-profile technology companies. All of these feature as a central practice, pair programming, said to result in rapid, high-quality, sustainable, iterative development capabilities.

My contact with [Eta](#) commenced in May 2012 and, among other locations,⁸ I began observations at its HQ office in the US from March–June 2013. A second round of observation was conducted at this office from October–December 2013. Thus, the total duration for study with this site extended over a 18-month year period.

3.3.1.1 About ‘Sebastian’ (Informant 1019)

Sebastian, a pseudonym for informant 1019, is the COO of [Eta](#). He is calm, articulate, and inventive. Promoted from within over a sustained period, and therefore an embodiment of the [Eta](#) culture (Kunda 2006, p. 232), Sebastian worked at [Eta](#) first as a software developer and later as a Principal with responsibility for leading client engagements. In 2008, he was promoted to vice-president and oversaw the company’s expansion through several new offices. This was the role Sebastian held when I first met him. He was subsequently promoted to COO in September 2012. He became involved with [Eta](#) in 2000 as a software developer and practitioner of its evolving methods, which, as described above, centre around the core practice of pair programming. Professionally evolving from the position of consumer of such methods to producer, he is now seen to have had a foundational role in defining the company’s development process and methodologies. With an

⁸Observations were carried out at three different physical locations within [Eta](#); two in the US and one in Europe.

educational background in mathematics, he began programming as a pragmatic step to earn a living. In describing this transition, he told me that ‘I think I just showed such an interest and ability that I was just in, in terms of being an actual engineer’ (Interview 1019, 25 Jun 2012). He met the founder of [Eta](#), Alex in 2000 when he was working at another company whom [Eta](#) was consulting to, describing what he calls a ‘seminal’ moment:

I was working under Alex from 2000 on, because he had free rein to implement his practices at this company, and that company actually was a bit of a seminal moment. It was just after Kent Beck’s first Extreme Programming book (2000) came out—literally a few months later, I believe, and Kent Beck was actually on the project team, and Alex and his kind of band of comrades was [sic] there, all very familiar with this style, and he managed to get, or someone managed to get the CEO to buy in to try out what was then this ‘extreme programming’, with really no reason other than it sounded good and there was a book.

That, I would say, was my—I had only been coding professionally for a year and a half, but we were doing it with such discipline that I was just forced to try it, and I had the usual reactions, which were: “Pair programming, crazy; test-driven, crazy; emergent design, crazy; engineers not making up requirements, crazy”—all the usual reactions. But because we were just simply forced to do it, and I was, obviously, junior, we just did it, and that’s how I still preach is the best way to try it, where you just really suspend disbelief, or get forced to do it (Interview 1019, 25 Jun 2012).

Sebastian’s technical expertise is well-regarded in the firm as are the results he has achieved, both of which, according to Grint, give rise to the moniker of leadership (2005a, p. 18). This, and the formal appointment of the titular position of COO (*ibid.*), mutually support the claim that Sebastian wields leadership within [Eta](#).

3.3.1.2 About ‘Ruby’ (Informant 1036)

Ruby, a pseudonym of informant 1036, is the executive assistant (EA) to Sebastian. She is centred, soft-spoken, yet firm. She assumed this role in September 2012 when Sebastian was made COO.

Prior to this, she was an EA to a CEO at another company. She explained to me that in that role, her previous CEO would call her up on the weekend saying he wants to go to Tokyo—“make it happen”. In her view, the previous company grew too fast to sustain itself and, in the process, did not add administrative staff as they grew. Only the programmers were valued. In contrast, she viewed Sebastian as thoughtful and said that

she was treated with much more respect at [Eta](#). She found the job through a friend who was a programmer at [Eta](#). Later, Sebastian said something to the programmer about wanting to look for someone and her friend recommended her (field diary 01 May 2013). Ruby, like some of the other EA's I followed, had a background in a customer-facing role in the hospitality industry, suggesting synergies between these kinds of roles.

While not a formal leader, there are aspects of Ruby's work practice that lay claim to leadership. In keeping with Palen and Grudin's research, the COO's electronic calendar is used as a communication tool (2003, p. 163), there is an open acknowledgement by Sebastian that Ruby controls his calendar. For instance, when asked by a report if he has time available to meet in the future, Sebastian responded, gesturing to Ruby, 'You'll have to ask my boss.' (field diary 25 Nov 2013). While perhaps joking, Sebastian is nonetheless reinforcing through humour (Meyer 1997, p. 202) what I had previously observed; that Ruby is responsible for—and therefore in charge of—Sebastian's calendar. Put another way, she is the leader of Sebastian's calendar and, in this exchange, Sebastian makes clear he knows this.

In assessing Ruby, Sebastian mentioned to me that she 'could be doing much more than being an assistant, but she does not want the responsibility' (field diary 03 May 2013), suggesting that he sees her as a highly capable person who could easily have an executive role if that was her desire. In my observations, Sebastian treated Ruby as a peer rather than a subordinate to whom one issues directives.

3.3.1.3 About Walt (Informant 1030)

Walt, a pseudonym for informant 1030, is a senior programmer for [Eta](#). He works in a city where [Eta](#) have no formal offices and he works from home, which is where I observed him in May 2012. While not a formal leader, there are aspects of Walt's character, as it is perceived by the company and the role he plays with respect to managing client relationships, that suggest implicit leadership practices are involved with his work. This is exemplified, for example, by the fact that he is one of [Eta](#)'s only employees who does not regularly work in an [Eta](#) office but instead does all of his pair programming remotely through an array of computational objects.

Walt's technical expertise is highly respected in the firm as are the results he has achieved, both of which, are aspects of the fivefold typology presented in figure 2.4 on page 32. Indeed, Walt and others at [Eta](#) explained to me that these qualities are the basis on which he is granted the autonomy to operate his own virtual office. As a result of [Eta](#)'s emphasis on pair programming, Walt has developed a number of novel practices around remote pair programming.

3.3.1.4 About Ari (Informant 1018)

Ari, a pseudonym for informant 1018, is the director of the European office for [Eta](#). I began interviews with [Eta](#) before the European office was opened, and thus, had the opportunity to speak with Ari a number of times before he relocated to Europe to open the office in the autumn of 2012. My observations with Ari span from September 2012 through February 2014.

One of the fascinating aspects of shadowing Ari over this period is that I was able to observe how a seasoned member of the leadership team goes about establishing a new office in a new location. Part of what I observed therefore includes a process whereby an intangible idea (a European office) is brought into existence through a process whereby a set of practices are established such as regular weekly meetings, the development of relationships, relocation of current staff, hiring of new staff, and solicitation of potential clients, resulting in client contracts, tangible projects, and a physical office.

3.3.2 About Epsilon

[Epsilon](#) is the pseudonym for a privately held clothing manufacturing company. Its revenues are said to be in the \$250 million per annum range. The company has one headquarters based in the US. No shadowing was conducted at [Epsilon](#); data collected at this site was limited to documentary evidence and interviews of its CEO and top management staff that included its chief financial officer (CFO) as well as vice-presidents of sales, operations, marketing, and product development, carried out between March 2010-2012. These interviews are enumerated as part of appendix [E](#). I also had an opportunity to conduct a number of site visits at [Epsilon](#) as part of an earlier consulting project that completed approximately nine months before the commencement of this research. These visits allowed for on-site observation and engagements with senior executives of the company, including the CEO, that further inform the data set. Under the separate terms of the agreement executed for that body of work, these data can be used within this study as long as anonymity is protected.

3.4 Chapter Summary

In this chapter, I have presented the methodology deployed to conduct this study. I have explained the research approach and limitations, the inclusion of reflexivity and diffraction as constant companions in my research, data collection, analysis, and interpretation. I have also presented the ethical considerations at play in this study and information about the sites and key informants included in this study.

The next chapter commences the empirical presentation of data by exploring leadership in the practice of pair programming.

Chapter 4

Pair Programming

Infrastructure is both relational and ecological—it means different things to different groups and it is part of the balance of action, tools, and the built environment, inseparable from them (Star 1999, p. 377).

4.1 Introduction

AT FIRST GLANCE, focusing on a material-discursive practice called pair programming (Beck 1999; Williams 2001; Williams and Kessler 2003) might seem a rather odd perspective from which to explore leadership, as within this human dyad of the ‘pair’ there are no formal leaders. Yet, it provides an ideal location to interrogate the construct ‘leadership’, for as I will demonstrate, it provides a compelling account of how leadership is enacted through material-discursive practice even in cases where there is no official ‘leader’, a position to which little attention has been given; one that harkens back to Bion (1946) and the more recent emergence of the Tavistock school (Mumford 2003). The data for this case was selected based on Flyvberg’s critical case approach (2011, p. 307), as described in greater depth in section 3.1.3.4 on page 96.

This empirical focus provides a rather illuminating perspective on leadership—leadership in a human dyad enacted through computational objects. While this may not be a traditional ‘place’ to locate leadership, it nonetheless builds the foundation for one of the principal arguments I wish to put forward in this work: leadership shows up in the smallest possible groups and within the most mundane human engagements and, furthermore, is increasingly enacted *through* computational objects. In this fashion, the empirical case serves to support the claim that once leadership is viewed through its relation to computational objects, what ‘leadership’ is changes dramatically. Indeed, as I will adduce, sometimes these pairs of humans who program together are not even physically in

the same location, further reinforcing the role of the computational object in constituting their practice.

Moreover, many of the senior executives at the pseudonymous [Eta](#), the site where these observations were recorded, asserted their views that pair programming is a central and crucial leadership practice within the organisation. This framing supports yet another strand of my argument: leadership acts as a symbolic resource (Ailon-Souday and Kunda 2003) or repository for values. That is, it points to an underlying process of human categorisation (Bowker and Star 1999) of value and worth (Boltanski and Thévenot 2006; Mailhot et al. 2014).

For example, the COO of [Eta](#) explains that programmers who ‘pair’ together:

[A]re actually doing a leadership practice because they’re having discussion [and making decisions] about what lines of code to allocate as resources (Interview 1013, May 10, 2013).

Here, the COO evokes Useem’s argument that one location of leadership is found in decision-making regarding a ‘discrete, tangible, and realistic opportunity to commit enterprise resources to one course or another on behalf of the firm’s objectives’ (2010a, p. 510).

From Useem’s perspective then, two programmers working together as a pair through one or more computational objects, making decisions about each line of code that gets committed as an asset to a larger enterprise system, qualifies as an enactment of leadership.

In sum, I argue that the practice of pair programming is a central feature of [Eta](#)’s ideology (Kunda 1986, p. 54), is highly valued within the organisation, and through these various mechanisms, is cited as ‘leadership’.

4.2 What is Pair Programming?

In 1996, Kent Beck developed a revolutionary approach to software development known as extreme programming (XP) (2000) in response to the complex problems involved with a large-scale software project to redesign DaimlerChrysler’s payroll system (Beck 1999; Garzaniti et al. 1997). The approach emphasises ‘sustainable developer oriented practices’ (Larman and Basili 2003, p. 54), and was the first to formalise the practice of pair programming. In his 1999 paper, Beck sets out 13 practices as part of XP and describes pair programming simply as a process whereby ‘all production code is written by two people at one screen/keyboard/mouse’ (1999, p. 71). Beck’s credibility in proposing his novel practices was based on the *results* (as depicted in figure 2.4 on page 32) achieved whilst at

DaimlerChrysler and this is perhaps one of the main reasons his paper was so influential. It can thus be interpreted as a form of leadership.

In the above-quoted paper, Beck explains that one of the rationales behind pair programming is to enable programmers to better test their code *as they write it* (1999, p. 74), testing being a process that was previously temporally separated. Indeed, within XP, testing is ‘at the heart’ (*ibid.*, p. 73) of the approach. Through XP, another novel practice was introduced whereby code was tested as it was written. That is, rather than being an instrument applied to code *after* it has been written, what XP proposed is that *tests themselves* be mobilised as a development/writing tool in the programming process. Beck explains that in XP:

Programmers write their own tests and they write these tests before they code. If programming is about learning, and learning is about getting lots of feedback as quickly as possible, then you can learn much from tests written by someone else days or weeks after the code. XP primarily addresses the accepted wisdom that programmers can’t possibly test their own code by having you write code in pairs (*ibid.*).

In this fashion, pair programming is offered as a means to enable test-driven development (George and Williams 2003). There is an explicit focus on learning through an increase in feedback enabled by bringing the test temporally closer to the writing of the code. In this fashion, the test becomes a critical lens through which the programmer can interrogate their own code as it is written.

Beck also makes clear that within pair programming, there are explicit roles to be played. He tells us that:

There are two roles in each pair. One partner, the one with the keyboard and the mouse, is thinking about the best way to implement this method right here. The other partner is thinking more strategically:

- Is this whole approach going to work?
- What are some other test cases that might not work yet?
- Is there some way to simplify the whole system so the current problem just disappears?

Pairing is dynamic. If two people pair in the morning, in the afternoon they might easily be paired with other folks. If you have responsibility for a task in an area that is unfamiliar to you, you might ask someone with recent experience to pair with you. More often, anyone on the team will do as a partner (1999, p. 58).

In this establishment of a specific ‘strategic’ role or *position* (as depicted in figure 2.4 on page 32), this role can also be understood as a form of leadership whereby the ‘strategic’ role provides strategic leadership (Hernandez et al. 2011, p. 1179) in addressing the questions Beck raises. Moreover, the latter portion of the quoted paragraph provides the basis for an approach that can be understood as a distributed form of leadership, where the *process* (as depicted in figure 2.4 on page 32) of knowledge sharing is present (Bolden 2011, p. 258).

This short description provides the reader with a basic understanding of pair programming, including some details on its emergence as a practice, and some of its distinctive qualities. In particular, the aspect of there being no formal leader in the human dyad, but instead a dynamic shifting of roles suggested that this practice would be an interesting place to explore leadership practices and their relationship to computational objects. In the next section, I discuss the findings of this particular investigation.

4.3 Findings: Pair Programming at Eta

At Eta, I observed pair programming at three locations within their organisation. While there were certain similarities in structure at each location around how pair programming was constituted, a key distinction was that in some cases the pairs were physically proximal, while in others they were remote. In the cases I observed, the latter *remote* pairing also involved additional computational objects.

I present below two episodes that explicate how various aspects of leadership are enacted within the pair programming dyad. The first concerns the ways in which various aspects of leadership are materialised in the material-discursive practice of the remote pair and the computational objects through which they interact. The second depicts a more radical case where leadership practice is initiated by a computational object, which serves to support my claim that computational objects are both integral to modern-day leadership practice but, in a literal and material sense, often constitutive of it. For convenience, the findings presented herein are summarised in table 4.1 in terms of observed material-discursive practices and the dimensions of leadership (as depicted in figure 2.4 on page 32) they have been analytically associated with.

4.3.1 Episode One: ‘Driving’ and Other Forms of Leadership

I begin with an (approximate) 45-minute time slice of the remote pair Walt and Robert:

At 10:28 a.m., Robert asks ‘Where did we leave it yesterday? There was stuff in the user interface (UI) we wanted to clean up.’ Walt is looking at code and

Episode(s)	Observed material-discursive practice	Associated leadership dimension(s)
I	Overcoming 'resistance to closure' through 'persuasion' (Larsson and Lundholm 2010, p. 1102) or 'empowering leadership', 'creative process engagement', and increased 'employee creativity' (Zhang and Bartol 2010, p. 117)	<ul style="list-style-type: none"> ● person ● process ● purpose
I, II	'Driving' and the negotiation of (keyboard) control or authority (Grint 2005b, p. 1477)	<ul style="list-style-type: none"> ● person ● position ● process ● result
I, II	The 'driver' talking out loud; the 'observer' offering direction (Van Velsor and O'Connor 2007, p. 32; Uhl-Bien, Riggio et al. 2014, p. 90); strategic leadership (Hernandez et al. 2011, p. 1179)	<ul style="list-style-type: none"> ● process ● result
II	Computational object as source for guidance, knowledge, and information (Alvesson 2011b; Nonaka and Takeuchi 2011).	<ul style="list-style-type: none"> ● position ● process
II	IM as a medium for decision-making (Useem 2010a, p. 510)	<ul style="list-style-type: none"> ● position ● process
II	Build break alert: computational object as the source of leadership command authority (Grint 2005b, p. 1477)	<ul style="list-style-type: none"> ● position ● position ● result ● process ● purpose

Table 4.1: Analytical Summary of Material-Discursive Practices observed in Pair Programming and Their Association with Dimensions of Leadership, Grouped by Episode

suggests they start breaking down, or refactoring,¹ the existing code.

Robert [the remote pair] is just watching the screen in front of him and not looking at the camera at all, not saying a word. He is especially quiet and withheld compared to the way I saw him yesterday. Meanwhile, Walt is talking about the code and what he thinks. This goes on for some time and finally Walt asks Robert what he thinks. Robert responds, but it's almost inaudible and sounds like mumbling.

The practice of thinking/talking out loud is common in the coding pairs I have observed and this is precisely what Walt is doing. In principle, thinking out loud enables the listener to question the speaker's thoughts, and to establish a bond in the pair that can lead to a way of working that might be described as 'thinking together' (Scharmer 2009, p. 296).²

Walt now realises he is not sharing his screen, an omission that, surprisingly, Robert has said nothing about. Walt asks for a short break and goes to get

¹Refactoring is a software engineering practice to satisfy the dual constraints required by production software to satisfy increasing requirements concurrent with the need for reusability (Gamma et al. 1995, p. 391). These constraints provoke a tension that can result in code that is difficult to read or poorly organised, sometimes called 'spaghetti code' (Boehm 2006, p. 13). Refactoring is thus a means whereby the goals that each of these constraints impose are achieved by restructuring the code so that it is considered more readable whilst simultaneously maintaining its behaviour (Opdyke 1992, p. iii).

²A more vivid way of describing this is to draw on Hutchins's notion of 'an ecology of thinking in which human cognition interacts with an environment rich in organizing resources' (1995a, p. xiv).

some coffee and Robert goes to get water while the build/test tool kicks off a local build and test of the code base. The build/test tool passes 15 tests, resulting in zero failures.

Walt looks at the difference between the previous block of code that was committed to the source control system and the current working copy. Robert is cradling his chin in his palm, looking intently at the screen in front of him. Walt says he wants to commit the code to the source control system. Robert is visibly unresponsive. Walt types in a comment for the pending check-in and checks the code in.

They move on to the next task and Walt offers Robert control. Robert accepts this silently. As Robert types, Walt offers commentary about limitations of the approach Robert is taking, but suggests that they continue and see if it ‘feels right’.

Robert runs the build/test tool and a number of errors show up. There are a total of 17 tests and seven test failures. Walt suggests a logical modification; Robert says ‘yeah, that would be good’. Walt suggests an expression can be condensed from several lines into one line. Here, Walt offers guidance to Robert.

At 10:50 a.m., Walt corrects a type declaration³ on the scope variable.⁴

At 10:51 a.m., the build/test tool reports 18 tests run and eight failures. Robert is writing a class⁵ and then proceeds to write a constructor⁶ for that class. At 10:53 a.m., the build/test tool reports 18 tests and seven failures.

Walt moves in to correct. He suggests to Robert that he adds stubs, or boiler-plate code, to implement a particular class so that the tests will pass. Robert seems a little more interested now.

At 10:58 a.m., Walt is driving again. The implemented class is now in place.

³In modern programming languages, variables are often preceded by ‘type declarations’ such as `INT` for integers or `STRING` for textual data. This is a hint to the compiler (as well as a form of documentation to the reader of the code) so that when the code is compiled into machine/byte code, the appropriate storage is allocated by the operating system to the variable. (Backus et al. 1963, p. 13).

⁴A variable is considered in ‘scope’ when it is used only at a particular point in the control flow of the code, after which it is discarded or forgotten. This is in contrast to a ‘global’ variable that is available throughout the control flow of the code. Such distinctions have significant consequences for the management of computational memory, among other things. See Wulf and Shaw 1973 and George and Sager 1973 for a discussion and debate on the topic.

⁵Within object-oriented languages, classes are the templates/recipes for ‘objects’ that will be instantiated into memory when the code is executed. See Goldberg and Robson 1983, p. 40 for further discussion.

⁶A constructor is code used to create a software ‘object’ for a particular class within the computer’s memory. Each ‘object’ created by such a constructor is an object *instance*. (*ibid.*).

Walt suggests lazy initialisation⁷ and asks if the items in the `NameOfClass` should also be scoped. Walt also suggests that it might be best to keep that context for now. Walt continues, saying that he wants to get line 13 and 18 of the file to work.

At 11:07 a.m., they are writing the unit tests first and watching them fail, and then Robert is writing the code to enable these to pass.

At 11:15 a.m., Walt is driving now and, with the modifications he makes to the code, the errors increase from three to five.

At 11:17 a.m., an issue referring to the wrong object type is fixed. We are now back to two errors (field diary 1030 26 March 2013).

4.3.2 Analysis: Episode One

Before proceeding with an analysis of this episode, I would like to first call the reader's attention to the materiality of Walt's impressive arrangement of computational objects that both enabled and constituted remote pair programming, where a number of important features are discernible. These are rendered in figure 4.1.

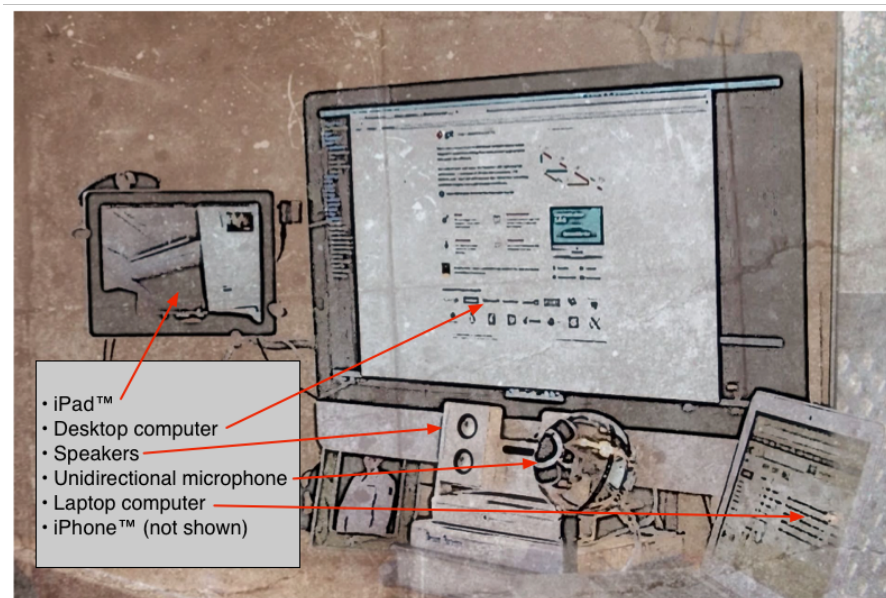


Figure 4.1: Anonymised Image of Walt's Remote Pair Programming Setup

⁷Lazy intitalisation or lazy loading, is a design pattern whereby data, perhaps being loaded from a database, is not all loaded at once. Instead, 'a marker in the object structure [is created] so that if the data is needed it can be loaded only when it is used. As many people know, if you're lazy about doing things you'll win when it turns out you don't need to do them at all' (Fowler 2012, p. 200).

Computational Object	Description
Desktop computer	The desktop computer is centrally positioned and acts as the primary locus of human attention (Guimbretière 2002, pp. 15-19, 2003, p. 53). It is where programming activities are projected and, in general, it is the rendering of this screen that is shared/mirrored with the remote party in the other location, fundamentally constituting pair programming.
iPad™	The iPad™ is used primarily for FaceTime™ and Google Hangouts™ to virtually connect the remote pair. It is positioned to the left at about 11:00 and at eye level to facilitate ergonomic viewing. It is also mounted on an articulating arm so that it can be easily adjusted <i>in situ</i> .
Speakers	Centrally positioned speakers are plugged into the iPad™ and therefore place the audio of the remote pair spatially inline with the desktop computer.
Unidirectional microphone	A tripod-based unidirectional microphone is placed to the right of the speakers and is plugged into the iPad™ so that Walt can move freely within the workspace and be heard by the remote party in the other location.
Laptop computer	A laptop computer is positioned to the right of the desktop computer. This computational object is generally not shared with the remote pair and provides Walt with a 'private' computational space.
iPhone™	While not rendered in figure 4.1, another substantive part of Walt's array of computational objects is an iPhone™ which he used to send and receive various kinds of messages while involved in the pair programming activity. For example, these can be signals to the other party either before or after a pairing session to coordinate specific details, such as communication channel.

Table 4.2: Array of Computational Objects Employed by Walt for Remote Pair Programming

Figure 4.1 depicts a plethora of computational objects that have been assembled by Walt to facilitate remote pair programming. These are enumerated in table 4.2 and document the extent of thought and effort given on the part of Walt to construct an environment where remote pair programming functions as seamlessly as possible.⁸ Based on his statements to me and various blog posts he authored on the topic, Walt seemed to take great pride in his work on the development of this sociotechnical frontier. It is through this arrangement of what Latour refers to as the 'assemblage of human and non-human elements' (1999, p. 159) or what Barad calls 'material-discursive practice' (2007, p. 178) that the phenomenon of remote pair programming—and any attendant leadership that might be observable in it—is actually produced.

Within the episode, evidence of leadership practice is present in a variety of forms throughout this engagement between Walt and Robert. It begins with Walt offering direction (Van Velsor and O'Connor 2007, p. 32; Uhl-Bien, Riggio et al. 2014, p. 90), suggesting to Robert that they take the approach of refactoring and Robert's tacit acceptance of this suggestion, aligning with the leadership dimension of *process* as depicted in figure 2.4 on

⁸This is not to mitigate the role of the endless legion of human and non-human actants who participated in the design, production, and distribution of these computational objects (Latour 2010a, pp. 2-3); however, this legion is not the focus of the present study.

page 32.

There is also an interesting dynamic that unfolds between Walt and Robert where Robert is withdrawn and uncommunicative, as evidenced by Robert not looking at the camera, his mumbling when asked what he thinks, and his failure to mention that the screen is not being shared between them. It is not until Walt realises he has not shared his screen that this fact materialises. Consequently, until that point, Robert has not been able to see what Walt has been doing and instead was only able to hear it by virtue of Walt's talking. It is Walt, not Robert, who picks up on this detail of the state of the material-discursive practice.

To borrow Larsson and Lundholm's terminology, Robert is exhibiting a 'resistance to closure' (2010, p. 1102), however, in my use of their term, I extend it to include engagements that go beyond talk. Specifically, I also include actions relating to computational objects, such as initiating builds, and the dyadic typing, mousing, and watching of computational object screens that occurs as part of pair programming. I argue, therefore, that Robert resists this closure in the material-discursive practice of pair programming through his various forms of nonverbal communication and/or inactivity that include not looking at the camera, not responding in full sentences, and not telling Walt that the screen was not being shared.

To be clear, I am not asserting beyond the shadow of any doubt that leadership lies within these practices; rather, I am pointing out that if one looks at the literature, there are numerous precedents to suggest that these practices *can* be interpreted as leadership. And, as I will argue, it is the material-discursive practice of *citing* leadership that brings leadership into existence within a member's experience, just as my citing it within this dissertation brings it into yours. In this sense, talking of 'leadership' is always performative and any 'leadership' that exists can *only* do so because some person or entity evokes it in a way that is convincing or acceptable to the participant in that material-discursive practice. I elaborate further on this point in section 4.4.

For the present moment, the point I want to make, according to Larsson and Lundholm's, one of the functions (and therefore 'markers' of) leadership is the overcoming of such resistance (2013, p. 1022). The preceding episode shows the dynamic of resistance going on for some time until just before 10:50 a.m. when Walt offers Robert control of the keyboard. Such negotiation of control is enmeshed within extant meanings of leadership (Alvesson and Spicer 2012; Barker 1993; Collinson 2005; Hales 1986).

Moreover, within the human pair programming dyad there are particular constraints that derive from a practiced relationship with the computational objects, one of which is that only one person can type code at a time. In practice, this generally means one person holds the keyboard and 'drives', as it is commonly called by the practitioners I

observed. In this sense, it bears a close resemblance to conversational turn-taking (Sacks et al. 1978). The person ‘driving’ is the person actively writing the code. In this and other instances of practice I observed, this took the form of the ‘driver’ talking out loud about what they were typing as they typed it.

Based on these various precedents, to say that these are leadership practices is within the realm of possibility by means of the articulation of what the driver’s thinking or rationale is regarding what they were typing. In other words, by simply thinking/talking out loud about how they planned to solve a particular software engineering problem, they were also engaging in the articulation of a vision or strategy towards some specific business goal (Guastello 2007; Montgomery 2012; O’Reilly et al. 2010). This perspective corresponds to the leadership dimensions of *position* and *process* as depicted in figure 2.4 on page 32.

Thus, when Walt offers the keyboard control to Robert, this appears to engage Robert at a higher level in that he demonstrates the active typing of code, the initiation of builds, and the utterance of fully articulated words. As with Larsson and Lundholm’s study, through ‘repeated affirmative responses [...] agreement is gradually developed and the persuasion thus accomplished’ (2013, p. 1022).

The ‘persuasion’ here is to convince Robert to participate more fully in the material-discursive practice of pair programming. This is evident in Walt’s various offers and support to Robert. Accordingly, I characterise the approach that Walt took here as ‘empowering leadership’, ‘creative process engagement’, resulting in an increased ‘employee creativity’ (Zhang and Bartol 2010, p. 117). This is a mode of leadership that aligns with the dimensions of *purpose* and *person* as depicted in figure 2.4 on page 32. My claim is that it was evidently Walt’s aim to engage Robert in pair programming and the means by which he did so were through the capabilities of his personality—as enacted through computational objects.

Then, at 10:50 a.m., Walt takes over ‘driving’ without any discussion—Walt simply starts typing in what might be thought of as an ‘open space’ where Robert was not typing, analogous to jumping in at a conversational turn (Sacks et al. 1978). This is a phenomenon I observed quite often between many pairs. This phenomenon has also been closely observed in terms of the negotiation of authority in Linde’s research on helicopter flight crews (1988), however, I extend her argument here to make the claim that such negotiation can also constitute acts of leadership along the dimension of *position* as depicted in figure 2.4 on page 32.

I make this claim because within this passing back and forth, the *role* each member plays also changes. According to Beck (1999, p. 58), the ‘driver’ talks out loud, making audible their thinking process whilst writing code whereas the ‘observer’ offers strategic

feedback, which can be interpreted as a leadership practice along the dimensions of *position* and *process* as depicted in figure 2.4 on page 32.

Moreover, the kinds of practices identifiable in this role of the ‘observer’, according to Hernandez et al., involve ‘strategic choices [...] behavioural processes by which strategic leadership influences organizational outcomes’ where such leaders ‘can guide interactions among other organizational members and channel knowledge’ (2011, p. 1179). Such an approach is prefaced on the leadership dimension of *result* as depicted in figure 2.4 on page 32.

Thus, the passing of keyboard control, I argue, provides markers for leadership practice within the material-discursive practice of pair programming across a number of dimensions depicted in figure 2.4 on page 32. First, when one party spontaneously ‘takes over’, they enact through their *personality*, and with a specific *purpose*, a change in *process*. Second, in so doing, the material-discursive practice is dynamically restructured such that the roles are reversed and the person formerly ‘driving’ is now placed in a role where they enact what can be considered the leadership practice of offering strategic guidance. In this fashion, I argue that there is evidence for specific leadership practices that can be identified with each role, suggesting leadership in the plural (Denis, Langley and Sergi 2012).

Yet within the dyad described in the episode above, I rarely observed Robert playing the role of observer as a strategic guide. Instead, what was more readily observed was Walt playing both of these roles in ways that were more closely identifiable to Beck’s description. Thus, when Walt offers commentary at close to 10:50 a.m. about limitations of the approach Robert is taking, he injects an alternative perspective in line with Beck’s vision of pair programming (1999, p. 58). And again, at approximately 10:53 a.m., Walt advises Robert while he is writing code that he might want to approach the writing in a particular fashion, providing strategic direction (O’Reilly et al. 2010). In these engagements, while the roles shift dynamically, we see how particular roles are played, that align with the dimension of *position*, as depicted in figure 2.4 on page 32.

During this engagement, we see an increasingly fluid dynamic between the pair where control passes freely between the two of them and where tests are being consistently written and run as part of the material-discursive practice of pair programming. This kind of engagements is typical of the instances of pair programming I observed, although it is clear that, in this remote pairing context, the computational objects play a constitutive role in enacting the material-discursive practice, for in addition to providing the context of a shared programming environment (which is also the case in face-to-face pairing), the computational objects also play a constitutive role of providing the communicative link between the pair.

I therefore argue here that within the short space of 45 minutes, the empirics provide evidence for all five dimensions of leadership as depicted in figure 2.4 on page 32. These findings are summarised in table 4.1.

The question then arises, ‘Was what I observed leadership?’ I could argue that it was, based on my citations of the various dimensions of leadership and the extant literature that align with the observed behaviour, but even if that is the case, that is not my aim here. My point in drawing the reader’s attention to the way in which the observed practices align with these dimensions is to make visible what may well be the ‘raw materials’ members employ when they materialise leadership through a citational material-discursive practice. Thus, within a context such as Eta, the way ‘leadership’ comes into being *qua* leadership in practice is through the citation of these dimensions by *members* and their application of these citations to observed material-discursive practice: the enactment of a citational material-discursive practice that references some other enacted material-discursive practice.

Verily, within Eta, evidence of such citations is present. For example, in analysing an internal electronic discussion board that is materialised by and accessed through computational objects, a number of statements are made by both employees and senior leaders explicitly ascribing leadership to the material-discursive practice of pair programming. I choose this data source in particular as the statements found therein precede my engagement with the site. In other words, they precede my questioning members about ‘leadership’ and looking for it *in situ*. Thus, they provide here a particularly trustworthy form of supporting evidence for my argument that precedes any activities I undertook that may have biased or led the informants in any way to highlight leadership towards the ends of my research. For example, one employee asserts with respect to a client engagement that the practice of pair programming:

[C]learly led to a [positive] change in both engineering leadership and process
(Eta Internal Discussion Database).

Here, the employee links leadership on the part of engineers as a management function resulting in effective changes in business process and client engagement, binding this citation with the leadership dimension of *process* as depicted in figure 2.4 on page 32.

The founder of the company offers similar remarks, linking the desired outcomes (*results*) of pair programming with the leadership dimensions of *person*, *position*, *process*, and *purpose*. He asserts that:

The key to sticking with a process—or perhaps a better way to express it would be to continue to *care* about process, since it doesn’t really matter if it maps

exactly to what we do—is support at the executive level (Eta Internal Discussion Database).

The founder cites explicit links between producing *results* (‘sticking with it’) through a *process* (pair programming) and a *purpose* (continuing to ‘*care*’), all of which he claims is underpinned by specific people (associated with the leadership dimension of *person*) who hold certain executive leadership *positions* within the organisation. Thus, all five dimensions of leadership as depicted in figure 2.4 on page 32 are mobilised to underscore what makes Eta ‘special’ or ‘great’. What the founder is pointing out here is that this ‘sticking with a process’ is something Eta does particularly well in relation to the material-discursive practice of pair programming. The statement therefore points towards what is viewed as important or valued at Eta, that which is associated with the category ‘leadership’.

Thus, I claim, not only embedded within the material-discursive practice between Walt, Robert, and their computational objects, but also within the broader sphere of Eta itself is an enacted and performative ideology that involves the association of various material-discursive practices that includes humans and computational objects and their relation to what is valued within the organisation and cited as forms of ‘leadership’. All of these suggest the possibility that the production of ‘leadership’ is itself achieved through material-discursive practices that may involve citing one or more of the five dimensions of leadership as depicted in figure 2.4 on page 32 and its association with some other enacted material-discursive practice. To develop this argument further, I present a different episode within the same site where the possibility of machines ‘leading’ is investigated.

4.3.3 Episode Two: When Machines Lead

In the next episode, which covers an approximate two-hour time frame, I explore a different location within Eta: an office in the UK. In this setting, as opposed to the previous episode, all the pairs are physically together, as depicted in figure 4.2.

In figure 4.2, we see several groups of pairs together at a single table. This configuration was far more common at Eta than the remote pair programming presented in the first episode.

Looking closely at figure 4.2, there are four pairs, a total of eight people working simultaneously on a single software project, with each pair working on different tasks for the project as delineated in a work item tracking system (WITS). Each pair, as part of their pair programming practice, selects a pending work item from the system they wish to undertake. This approach reflects an imported material-discursive practice from lean manufacturing called *Kanban*, where workers select from available work based on their



Figure 4.2: Anonymised Image of Pair Programmers at an Eta UK Office Worktable

predilections (Poppendieck and Poppendieck 2003, pp. 72-76).

Also, within figure 4.2, prominently placed in the middle of the frame is a focal computational object—a large monitor, sometimes referred to as a *build monitor*, *build meister*, or *information radiator* based on its role to disseminate vital project information to the team on an ongoing basis (Elssamadisy 2008, pp. 157-160). As I will show, this particular computational object plays a particular role that aligns with understandings of ‘leader’ in a number of ways, both in terms of the manner in which it directs the pairs, and in their responses to it.

In this episode, I will focus on the pair consisting of Paul and Etienne, who are depicted sitting in the bottom left of figure 4.2, closest to the reader.

2:42 p.m. - It looks like four pairs are working right now. From the build monitor, I can see that the project was built three days ago with 78% volatility and a velocity of 15. It is not clear to me how these metrics are calculated, but the former refers to how many lines of code have changed with 78% of the codebase having changed recently (and thus highly ‘volatile’) while the latter refers to the rate at which work items have been completed in the current work cycle, or sprint, which at Eta is two weeks. There is also a section of the screen that shows the number of unstarted, started, finished, delivered, accepted, and rejected work items. The bulk of items are unstarted and a few, perhaps two items, are accepted. This suggests that the project is at its beginning.

2:58 p.m. - A build must have just happened. The display now says last build 27m and is still green. This means that a new build must have passed all the tests.

3:01 p.m. - I focus now on what I see on the screen directly in front of me and begin to listen more closely to Etienne and Paul. They are building a content management system and right now I see the login screen for the system they are building. There seems to be an error.

A discussion on how to move beyond the error ensues. They try logging in as different users and, in the process, discover some code where Etienne asks ‘How did this get in here?’ Paul answers, ‘It does what you want, just not in the way you expect it to.’

Paul goes into some files under the settings folder and starts poking around. He reports that the controller object that is used for the ‘edit’ page is not the same as the one used for the ‘show’ page. Etienne says that he understands, but he seems to be more concerned with how this bifurcation occurred.

For Paul, this is not a new phenomenon. He explains that this is something that happens when different people work on code at different times. Paul now employs a technique to focus the pair on how to proceed next. He attempts to articulate what they are trying to do. He starts by saying ‘we want to filter this list by partner’. Etienne says ‘We really underestimated this’, at which point Paul bends over with head in hands to think for a moment.

They continue to trace the current error in the debugger,⁹ but now Etienne is driving. This pair have a comfortable pattern where control of the keyboard is transferred without explicit verbal request. In this case, each pair has an individual keyboard and mouse connected to their monitor so they can freely control the system at any time.

While Etienne is tracing the error, an instant messaging (IM) comes in from a colleague not physically at this site. The colleague has asked Etienne a question; Etienne answers it and then returns to the tracing/debugging.

Then without saying anything, Paul takes control of the keyboard and tries a different syntactical approach using an `include` declaration.¹⁰

⁹A debugger is a software programme used to stop the execution of code at specific locations set by the programmers and allows for controlled execution. This functionality enables the programmer to explore the contents of memory as a means to identify and correct software errors (Rosenberg 1996, p. 2).

¹⁰This is a means through which code from pre-existing external code libraries can be easily included in the present code, and thus leveraged or re-used.

Etienne's colleague sends another IM and Etienne answers. This interruption is handled smoothly and without conversation between the pair, as a matter of course.

3:33 p.m. - Etienne gets up to go get coffee and asks me if I want some. I thank him, but decline, and get up to get some water.

3:40 p.m. - We are back at work and checking results on the test website. They have finished copying over the new code and making the required changes to connect it into the code base.

Running a test programme and debugging ensues. There are actually a few iterative cycles of this, as the tests do not run properly. Etienne has been running all of the tests. Then Paul makes an attempt. He starts editing, getting rid of one line and one file, tests and re-runs. They find something not quite right and this time isolate text strings in the debugger which they then search for in the code. They look in various files for where these text strings are. Paul finds these, adds one line of code to each, re-runs the test, and this time it is even worse.

In response to this, Etienne then points out that there is a default constructor that creates a new panel for this portion of the code. It is also clear from his tone that Etienne is familiar with this portion of the code. He suggests 'initialising the tab in a code module somewhere else.' Paul does this and the solution appears to work. They now have working code for this work item with all tests passing.

4:01 p.m. - As the work item is now complete, it needs to be checked in to the code base and marked as complete in the work item tracking system (WITS). Etienne brings up the WITS and selects the work item corresponding to the task they have been working on.

4:10 p.m. - Etienne stages and commits the files to source control system and then marks the work item complete in the WITS.

4:33 p.m. - They begin work on the next work item. This one involves setting the system up for internationalisation.¹¹ They first try to remember where to look in the file hierarchy of code for this change.

As they are getting their heads around the files they need to work with, Paul looks up and says 'Uh oh'. Etienne looks up and shouts 'No!' Someone else

¹¹This is a process whereby software is made functional across a number of languages (Aykin 2004, pp. 3-16).

in the room makes an artificial sound analogous to the ‘wrong answer’ sound one might hear on an American-style game show. Someone laughs. The office director says, with a slightly joking tone in his voice, ‘everybody stop’, taking the role of a mock policeman who has caught some criminals in the act.

Paul says, ‘I just happened to be looking there and it flipped red.’ He is referring to the build screen. The build has failed. The office director laughs and says, ‘Who did it?’

No one answers, but my sense is that Etienne’s and Paul’s last check-in that went in is what broke the build.

Now that the build has broken, as signalled by the computational object—the build monitor—and has been acknowledged by the group, the organisation of work shifts immediately for Etienne and Paul. Instead of continuing work on the internationalisation work item, they immediately shift to investigating the broken build.

4:37 p.m. - Etienne brings up the web-based system for inspecting builds. They start looking at the log documenting the broken build. ‘Unitialised constant action view,’ announces Paul from off of the log, following up with ‘That’s weird’. He then reads questioningly, ‘Asset tag? That makes no sense at all.’ Several seconds of silence follows, and then Etienne says ‘Oh, that’s not ours.’ Paul reads off more of the log and again, Etienne repeats, ‘That’s not ours’ and then immediately breaks into a refrain of ‘That’s not ours, someone messed up...’ to the tune of the ‘Na-nana-nana-nah’ song familiar to many western children.

Paul interjects with ‘But...well, hold on’ and continues looking at the log. Then a few seconds later, he identifies a line in the log and says, ‘Oh, that’s ours, OK’ and then a few seconds later says ‘false alarm, there must be something else in here.’

Acknowledging the difficulty in identifying the source of the error, Paul says ‘I don’t know, there are so many things in here, it’s hard to figure out...’ and then a few seconds later, ‘Ah, OK, yeah, OK, so we need to open that,’ suggesting that he may have found a possible source for the build failure.

After further inspection, Paul mentions a merge operation¹² they did awhile

¹²A good deal of managing code in larger projects revolves around source control systems (Loeliger and McCullough 2012). Within such systems, a *merge* operation ‘unifies two or more commit history branches’ (*ibid.*, p. 121). For example, developers may be working with some code from branch α on which their code depends. As they work on their code, they make new additions, and when committed to the source control system, would be referred to as branch β . Meanwhile, the original developers of branch α make changes to

back that seems to be missing from this file set.

A few seconds later, he announces, ‘There we are, expected false to be true, well, you’re not going to get very far...’ to which someone else in the room laughs at the utterance, mocking Paul, saying, ‘Im sorry son, life’s sometimes not what you expect.’ With this, the whole room bursts out in laughter.

Paul has now identified that problem as coming from their check-in where the code that they pulled from the source control system had not been properly merged. They now need to fix this.

Etienne takes the code that they have been working on and ‘stashes’ it as a temporary item in the source control system, and then retrieves the code that was previously checked-in.

Paul works on finding the missing code that was not properly merged and adds it to this set. They run the tests locally and they pass. Etienne then checks-in the code to the source control system and they return their focus to the newer work item (field diary 1058/1065 02 December 2013).

4.3.4 Analysis: Episode Two

While there are a number of similarities in this and the previous episode in terms of the material-discursive practices observable in Paul and Etienne’s engagement, what is distinctive in this account is the manner in which the computational object comes to the fore as an actant that ‘tells’ humans what to do—analogous to a human leader giving commands to her subordinates.

Along these lines, a notable phenomenon is my own orientation to the context, in particular, the way I myself oriented to the computational object as a means to gather information. Thus, at the beginning of the account and for the first three paragraphs of episode two is my own ongoing consultation/relation with the build monitor to gather local information through an engagement not dissimilar to an interview accompanied through ‘close observation’ (Van Maanen 1988, p. 19). By closely observing the projections made material through the computational object, I was able to discern, much in the same way I might ask questions of a human, aspects of the project status that suggested its initial phase. A crucial consideration here depends on what McLuhan argues is an important form of literacy (1962, pp. 36-40), where:

branch α concurrently to the changes being made by the developers on branch β . This creates a situation where the changes from branch α must eventually be *merged* with branch β in order to bring the codebase up-to-date. This does not occur automatically; the developers working in branch β must merge branch α and ensure that their code still performs correctly. This is normally done at a convenient time or at particular project milestones.

[T]echnology is introduced either from within or from without a culture, and if it gives new stress or ascendancy to one or another of our senses, the ratio among all of our senses is altered. We no longer feel the same, nor do our eyes and ears and other senses remain the same (1962, p. 24).

Thus for McLuhan, that I might be able to extend my senses through a computational object is a phenomenon in and of itself worthy of attention. Here, I characterise my own engagement with the computational object as an *accessible relationship* made possible in McLuhan's terms based on my own literacy with it—one I immediately and without question turned to as part of my own sensemaking of the context (Weick, Sutcliffe et al. 2005). It was through that relation I ascertained various project metrics by focusing with my eyes and not my ears. This is one of the impacts brought about by modern technologies—a shift from an aural to an optical society (cf. Braidotti 2006, p. 204; Haraway 1991a, pp. 188-189; McLuhan 1962, pp. 28-29). So, although I was there to observe Paul and Etienne, as part of my taking in context, the data shows that my attention went first to the computational object as an informant to the research. I, like my own human informants, am apparently not immune from the ubiquity and background status of computational object as sources for guidance, knowledge, and information. This status that computational objects hold as a source or *position* as depicted in figure 2.4 on page 32 for guidance, knowledge, and information is one also viewed in the literature as a source for leadership (Alvesson 2011b, p. 73; Nonaka and Takeuchi 2011).

Moving now beyond my own initial attention to the computational object at the start of the episode, I would like to call attention to the periods of material-discursive practice involving remote activity around 3:01 p.m. Despite Paul and Etienne being an embodied human pair situated in the same room, there was nevertheless a simultaneous stream of instant messagings (IMs) between Etienne and remote colleagues that were related to the deployment of the project that Paul and Etienne were working on. The ongoing communication between Etienne and these colleagues was situated within the same visual topography as pair programming, reinforcing the visual locus of attention (Guimbretière 2002, pp. 15-19, 2003, p. 53) and the primacy of the screen (Braidotti 2006, p. 204; Haraway 1991a, pp. 188-189). Such behaviour, in analysing its contextual detail, may also be understood as leadership practice, because Etienne was being asked specific questions to vouch for the readiness of certain code to be deployed. Thus, based on his *position* as depicted in figure 2.4 on page 32, the deployment team deferred to him for a decision (Useem 2010a, p. 510) before they proceeded.

Moreover, the fluidity with which Etienne's IM exchanges occurred was notable. There was a sense of flow with which Etienne handled these, one that I argue arises out of the communication system itself being situated within the same computational object as

the pair programming work. Thus, the ‘one-stop shopping’ approach that the computational object offers to its human can provide particular affordances that impact cognitive and communicative practices including the externalisation of thought (Nickerson et al. 2013), coordination (Zammuto et al. 2007), and increased specialisation (Leonardi 2011, p. 161). Such layered material-discursive practices beautifully illustrate the distributed nature of activity as a collective form of leadership, much in the same way that Hutchins’ study of how a collective of people, artefacts, and machines navigate a submarine (1995a, pp. 355-356).

Indeed, relational (cf. Cunliffe and Eriksen 2011; Fletcher 2012; Ospina and Uhl-Bien 2012), distributed (cf. Bolden 2011; Gronn 2002; Spillane 2006), and processual (cf. Day and Antonakis 2013; Koivunen 2007; Wood 2005) approaches to leadership rely on this same observation that Hutchins makes about cognition; namely that as a phenomenon not directly visible, we must cite it in some way for it to materialise. All of the approaches to leadership I just mentioned implicitly understand that citational process as occurring through social systems, which as can be seen from these episodes, must necessarily include the computational objects entangled as part of material-discursive practice. Therefore, the thesis I want to take forward is that leadership is not simply understood in certain ways, but that it is understood *as* leadership precisely because it is cited as such. I argue that leadership, following Ailon and Kunda, acts as a ‘symbolic resource’ (2003) standing for particular values within the context of a community such as an organisation. Thus, upon interrogation, leadership *always* stands for something else; some value or values within the active social system, for which the word ‘leadership’ is shorthand. In the specific case of the deployment team asking Etienne to confirm certain information, this underscores particular *values* around authority and responsibility that align with the leadership dimensions of *position* and *process* as depicted in figure 2.4 on page 32.

Then at 4:33 p.m., as Paul and Etienne are working on their next work item, the focal computational object stands mutely before the group but switches its colours from green to red, signifying a problem. Then, *in response to* it, Paul says ‘Uh oh’, the office director says ‘everybody stop’, laughs, and says ‘Who did it?’ In terms of the *temporal* order of these speech acts, they were *preceded* by the computational object signifying the issue and, in doing so, issuing a command to the group. Therefore, an important question at this juncture is who—or what—is acting as the leader?

One way to answer this is to say that the programmers who wrote the software, the people that built the computational object and the operating system, and all the other components, as well as the management who decided that this approach to operations would be implemented, were part of a sociotechnical assemblage of actants (Latour 1999, p. 198). This must include the computational object that enabled this enactment where a

crucial problem was reported and then solved. With this ANT-style analysis, we arrive, at a minimum, to a conclusion where a highly distributed form of leadership is present.

However, I would like to suggest something more radical. I propose that we have a situation where the computational object has become the *source* of leadership command authority (Grint 2005b, p. 1477), where, as Haraway (1991a, pp. 188-196) has suggested, the visual dimension is employed to control a group of people; not necessarily for nefarious means, but to control them nonetheless. In the performance of this material-discursive practice, it is the computational object that silently evaluates and delivers feedback to the the group, analogous to a human leader offering performance feedback. And from a temporal perspective, it is the computational object that explicitly initiates this chain of events where the group subsequently perceives a ‘problem’ that must be addressed as a priority. The command has been issued and has been received. Thus, in an important sense, I argue that the computational object is playing the role of leader, where it initiates action toward compliance, followed by the evident receipt by humans of authoritative orders on what to do. It is therefore plausible that this material-discursive practice constitutes a form of leadership as authority or command (Air Command and Staff College 2005; Benoit-Barne and Cooren 2009; Miller 2008), one that aligns with the *result* or *process* dimensions depicted in figure 2.4 on page 32.

But there is yet another sense that the computational object in this context embodies leadership. In its given formal *role*, it issues a command in a language that humans readily understand in regards to a problem that needs to be addressed with some urgency. Therefore, the role it plays is analogous to the one that Larsson and Lunholm’s manager (2013) plays in her leadership interaction with a subordinate, however, in their case, what requires a lengthy conversation between manager and subordinate, where the former must persuade the latter, happens in this episode within the space of eight seconds. Here, the dimensions of computational object’s ‘*personality*’ and its implicit *purpose* as depicted in figure 2.4 on page 32 are established by the ways humans respond to it. Thus, in this episode, we see all five of the dimensions of leadership: *person*, *result*, *position*, *process*, and *purpose*—all enacted by the computational object.

It is important to recognise, however, that this is not simply a claim about a computational object playing a leadership role. Rather, it is a claim regarding shared meanings and values that can be embodied by and/or attributed to humans and other objects within material-discursive practice. For just as leaders cannot lead without followers (Bligh and Riggio 2012b; Burke 1965; Kahai 2012), so too must the humans in the room understand the meaning and ramification of the message from the computational object and then play their parts in order for any ‘leadership’ to occur at all. The office manager articulated to and for the group this sensibility in his utterance of ‘Who did it?’ By making this state-

ment, he implies that that someone ‘did it’, verbally establishing the existence of a problem, and by extension, that someone needs to ‘fix it’. Etienne and Paul then demonstrated their recognition of the discursive nature of what just transpired. They understood that the build was broken and they needed to determine whether it was their fault. Whether one accepts that the computational object ‘led’ or not, this episode illustrates an example of direction initiated by a computational object that was subsequently responded to by the human group in kind. In this sense, the phenomenon of ‘leadership’ was performatively produced by the particulars of this material-discursive practice (Barad 2007, p. 178).

However, I would be remiss if I did not report that the members did not speak of ‘leadership’ in this episode and did not seem to think about what the computational object did as leadership. For these members, my observations revealed that for them, humans ‘do’ leadership. What is therefore fascinating about this case is that while the computational object may have functionally reproduced many aspects of ‘leadership’ as per my analysis, members did not see it as such. In this sense, I would say that while the possibility for a posthuman form of leadership was present, it was not materialised through subsequent citational material-discursive practice.

In this episode, I have demonstrated possibilities for how leadership practices are enacted by *both* humans and computational objects and then further distributed through the scaffolding provided by computational objects and their underlying systems. I argue that in this episode we have witnessed a case where it is possible that the computational object played the role of leader in a distributed system of leadership, authority, and responsibility, where the human participants are committed to the rules of the game (1953 / Wittgenstein 2009, 6-8e; Lyotard 1984). Interestingly, the informants did not see what the build monitor did, nor the impact it had on workflow as anything other than an instrumental intercession.

4.4 Discussion

The foregoing two episodes and accompanying analyses of leadership practice reveal a processual model of how leadership is produced (Day, Fleenor et al. 2014, p. 70; Dinh et al. 2014, p. 41; Langley, Smallman et al. 2013). In this view, leadership emerges *through* ongoing successions of material-discursive practice. This is a particular vantage point where what ‘leadership’ *is*—is enacted. Langley et al. describe this as the:

[P]oint at which ‘process’ meets ‘practice’, since how the past is drawn upon and made relevant to the present is not an atomistic or random exercise but crucially depends on the social practices in which actors are embedded (2013, p. 5).

These notions of ‘practice’ and being ‘embedded’ are precisely what I am attempting to foreground through my analytical emphasis of Barad’s material-discursive practice (2007, p. 178).

Simultaneously, by including computational objects as an actant in the analyses, I demonstrated how computational objects are intimately involved in the constitution and transmission of material-discursive practices that may subsequently be cited through further material-discursive practices as leadership practice. This intimate relationship with the computational object is demonstrated in the first episode where the entire engagement between Walt and Robert is materialised through their engagements with computational objects. That is, without these objects, they would not interact at all. I then show that prior to my research, members of the company refer to the material-discursive practices of pair programming and cite them as being associated with leadership through the five dimensions as depicted in figure 2.4 on page 32, thus materialising ‘leadership’.

The intimate relationship with computational objects is also demonstrated in the second episode where the computational object has been granted an authoritative role. Specifically, like a teacher or a manager, the computational object in the second episode evaluates work that has been submitted by humans and issues feedback to the group, sometimes resulting in direct commands to stop what they are doing and attend to a problem that it has detected. In so doing, it plays a particular *position* as depicted in figure 2.4 on page 32 in the organisational hierarchy. This accomplishment involves a subtle but crucial shift from the canonical relation of computational object as tool, where the user is the subject and the computational object is the object whose being is subordinated to the human (1927 / Heidegger 1996, pp. 64-67). However, in the case I presented, the role is reversed; the computational object takes the role of subject, directing its command to its object, the human group. Such a state closely aligns with Haraway’s views of technology *and* with the argument I am putting forward here regarding leadership. Thus, leadership, or leading, in the contexts I have presented, can be described as a phenomenon where:

[S]ocial relationships get congealed into and taken for decontextualized things
[...and where] social relationships include non-humans as well as humans as
socially [...] active partners (1997, p. 8).

Haraway’s perspective not only highlights the observable decontextualisation of technology as a relation but, more importantly, accounts for the invisibility of leadership to members in its enactment. Haraway’s view also aligns with Barad’s argument that the phenomenon of consciousness arises out of particular material-discursive arrangements that include both bodies *and* machines. Here, Barad asserts that

‘[M]inds’ are themselves material phenomena that emerge through specific intra-actions. Phenomena are real material beings (2007, p. 361).

Thus, in Barad’s agential realism, phenomena and not ‘things’ are the primary ontological elements, *all of which* arise through particular arrangements of material-discursive practice (*ibid.*, p. 178). Here I suggest, following agential realism, that the phenomenon of ‘leadership’ can be viewed as operating just like any other phenomenon that materialises; it arises through particular arrangements of material-discursive apparatuses and practices.

Elsewhere, Orlikowski and Scott (2008), Nyberg (2009), and Iedema (2007) have engaged with Barad’s agential realism in their respective IS and organisational research to underpin a similar perspective. Central to the position all these scholars take is the claim that:

Matter and meaning are not separate elements. They are inextricably fused together, and no event, no matter how energetic can tear them asunder. Even atoms, whose very name, *ατομος* (atomos), means ‘indivisible’ or ‘uncuttable’, can be broken apart. But matter and meaning cannot be dissociated, not by chemical processing, or centrifuge, or nuclear blast. Mattering is simultaneously a matter of substance and significance, most evidently perhaps when it is the nature of matter that is in question, when the smallest parts of matter are found to be capable of exploding deeply entrenched ideas and large cities. Perhaps this is why contemporary physics makes the inescapable entanglement of matters of being, knowing, and doing, of ontology, epistemology, and ethics, of fact and value, so tangible, so poignant (Barad 2007, p. 3).

Consequently, even when matter is ‘torn’ apart, Barad argues, meanings are still produced—and indivisible from—subsequent material (re)configurations. My application of this construct is the claim that the ‘meaning’ of leadership cannot be decoupled from the particular material-discursive practices that produce it. This is precisely why a practice-based approach is crucial in studying such a phenomenon: to glimpse the materialisation of leadership as it happens.

Moreover, I take it that Barad’s use of term ‘apparatuses of bodily reproduction’ (*ibid.*, p. 178) refers to arrangements of material bodies of any form. The implication here is that agency is not exclusive to humans but rather, like phenomena, constitutive of reality. Thus, from an agential realist perspective, that computational objects may possess the agency to lead is no surprise. What Barad is arguing here is that through the exploration of what might be considered the mundane, that understandings capable of shaking ‘the very foundations of Western epistemology’ (*ibid.*, p. 97) can be undertaken. Indeed, one of the central points of agential realism is a recasting of agency where:

The primary ontological units are not ‘things’ but phenomena—dynamic topological reconfigurings/entanglements/relationalities/(re)articulations. And the primary semantic units are not ‘words’ but material-discursive practices through which boundaries are constituted. This dynamism *is* agency. Agency is not an attribute but the ongoing reconfigurings of the world (2003, p. 818).

Accordingly, when these ideas are diffracted (Barad 2007, pp. 86-94; Nicolini and Roe 2014) through the the empirics presented above, whether in the way keyboard control is managed or the ways humans and computational objects influence each other through various dimensions of leadership, what Barad’s agential realism helps grasp is the processual emergence of particular phenomena arising through material-discursive practice. These phenomena may be understood and attributed as a symbolic resource (Ailon-Souday and Kunda 2003) and commonly called ‘leadership’ but remain enmeshed with the material-discursive practices that (re)produce them (Barad 2007, p. 170).

4.5 Summation

This chapter has interrogated the relationship between leadership practices and computational objects by analysing such practices in terms of material-discursive practice. It has focused on a particular set of material-discursive practices in pair programming, where within the pair there are no formal leaders.

By combining and extending Grint (2005a, p. 18) and Kempster et al.’s (2011) five-fold model of leadership as depicted in figure 2.4 on page 32, I have highlighted particular material-discursive practices within the empirics that illustrate how both humans and computational objects can be mobilised as categories within the five dimensions of leadership: *person*, *result*, *position*, *process*, and *purpose*. I suggest that this synthesis of Grint and Kempster et al.’s theoretical perspectives is a contribution to the leadership literature through my proposals that their models be integrated and my proposed extension to their work. Here I claim that leadership is not simply *understood* through the dimensions that Grint and Kempster et al. suggest but that material-discursive practices are understood as leadership precisely because they are *cited* as such. This is an argument that I will continue to develop in the coming chapters. Thus, I have argued that leadership functions as a symbolic resource (Ailon-Souday and Kunda 2003) or repository for values. That is, it points to an underlying process of human categorisation (Bowker and Star 1999) of value and worth (Boltanski and Thévenot 2006; Mailhot et al. 2014).

I presented two episodes to support this argument. In the first episode I demonstrated material-discursive practices that included the negotiation and assertion of control (Grint 2005b, p. 1477), the elaboration of strategy (Guastello 2007; Montgomery 2012;

O'Reilly et al. 2010), and the offering of direction as empowering leadership (Zhang and Bartol 2010, p. 117). I also showed that within the broader sphere of the site I studied the existence of an ideology (Kunda 1986, p. 54) around the association of various practices and their relation to what is valued within the organisation and cited as forms of 'leadership' prior to the commencement of my study.

In the second episode I expanded these ideas to show that the computational object acted as a source of leadership command authority (Grint 2005b, p. 1477) and I linked these ideas to the work of Haraway who has argued extensively regarding the means by which the technological and the visual are employed to control humans (1991a, pp. 188-196). In sum, I illustrated what might be understood as a posthuman form of leadership enacted by *both* humans and computational objects and distributed through the scaffolding provided by computational objects and their underlying systems. I argued that in this episode leaves open the possibility that the computational object played an unacknowledged role as leader in a distributed system of leadership, authority, and responsibility where the human participants are committed to the rules of the game (1953 / Wittgenstein 2009, 6-8e; Lyotard 1984).

Finally, in my discussion, I highlighted how the agential realism perspective I have taken in my analysis aligns closely with processual views of leadership (Day, Fleenor et al. 2014, p. 70; Dinh et al. 2014, p. 41; Langley, Smallman et al. 2013). I then highlighted another point that I believe to be a contribution to the literature—that Barad's agential realism helps us to grasp the processual emergence of particular phenomena arising out of material-discursive practice—in this case leadership. These phenomena are materialised through material-discursive practice as a symbolic resource (Ailon-Souday and Kunda 2003) commonly called 'leadership' but remain enmeshed with the material-discursive practices that (re)produce them (Barad 2007, p. 170).

Chapter 5

Emailing

Es kann auch sein, daß Geschichte und Überlieferung auf die gleichförmige Speicherung von Informationen eingeebnet und als diese für die unumgängliche Planung nutzbar gemacht werden, die eine gesteuerte Menschheit benötigt. Ob dann auch das Denken im Informationsgetriebe verendet oder ob ihm ein Unter-Gang in den Schutz durch seine ihm selbst verborgene Herkunft bestimmt ist, bleibt die Frage (1967 / Heidegger 1978, pp. ix-x).

It could also come about that history and tradition will be smoothly fitted into the information retrieval systems which will then serve as resource for the inevitable planning needs of a cybernetically-organized mankind. The question is whether thinking too will be terminated in the business of information processing (Heidegger 1967 / 1978 quoted in and translated by Heim 1987, p. 70).

5.1 Introduction

THIS CHAPTER BRINGS TO BEAR an alternate empirical framing to interrogate the relation between leadership practices and computational objects through a focus on leadership practices of emailing by formal leaders. Whereas in the previous chapter, the observed humans enacting pair programming were not formally granted any title of leader, many in this chapter are. This formalisation of *position*, as depicted in figure 2.4 on page 32, is perhaps the most common site to locate—and according to my argument—cite leadership. Thus, in canonical formulations, it is formal leaders that enact leadership (Bass and Stogdill 1990a, pp. 37-55; Weber 1946, pp. 245-250). But is this assumption valid? Moreover, drawing on the epigraph above, how might various forms of engagement with computational objects influence what leaders do, how they think, how

they make decisions? Through an engagement with the empirical material and extant literature, these are the central questions this chapter will explore.

Methodologically, by closely examining formal leaders' material-discursive practice with computational objects, I will demonstrate what we think of as 'leadership' is deciphered as a 'nexus of practices' (Schatzki 1996, p. xi). This conceptualisation of leadership-as-practice (LAP) (Carroll et al. 2008; Crevani et al. 2010; Endrissat and Arx 2013) is much less attached to an individual and much more dependent on various approaches to—and therefore distributions of—practice (Shove et al. 2012b; Nicolini, Mengis et al. 2011, p. 8).

To render this perspective, I select for analysis a particularly ubiquitous and, what may therefore appear on the surface, homogenous practice: *email* (Aral et al. 2012, p. 850; Dourish and Bell 2011, p. 36; Hayles 2006, p. 136; Johnson 2012, pp. 63–85). The data for this case was selected based on Flyvberg's critical case approach (2011, p. 307), described in greater depth in section 3.1.3.4 on page 96. By showing the variation formal leaders exhibit within what Ducheneaut and Bellotti refer to as a the *habitat* of email (2001), I explain how these practical variations lead to different sorts of engagements and outcomes and, by virtue of their association with different *results*, as depicted in figure 2.4 on page 32, how they can also be characterised as different approaches to leadership.

In summary, what this chapter argues is that the *way* in which formal leaders go about 'doing' (Nicolini, Gherardi et al. 2003, p. 21) a mundane, everyday task such as email has significant ramifications for the outcome of that practice—and for any leadership effects it may produce. My purpose, then, is to demonstrate how the details of practice not only establish particular roles for computational objects, but how they also constitute particular styles of leadership.

To proceed, I present a short introduction discussing the emergence of email as a large-scale practice.

5.2 Email: A Brief History

Email ultimately arises as a variation on established cultural and technological embodiments (Kirby 2008, p. 224) of language, writing, reading, and highly transportable media, the earliest form of which was perhaps papyrus (Harrison et al. 2001; Vandendorpe 2009). Crucially, the association of this range of embodiments has a long-standing connection to leadership. For example, early historical accounts argue that the technological capability of media transport in the form of early relay/postal systems led to strategic advantages for particular military leaders (Farazmand 1998). Indeed, the very word for the 6th century B.C.E. version of postal delivery, *angaréion*, was associated with the 'royal word' (Siegert 1999, p. 6), and thus explicitly bound to the leadership of the empire.

One of the earliest computational versions of what is now understood as email dates from 1965 on an early time-sharing system¹ at the Massachusetts Institute of Technology (MIT) called MAIL (Van Vleck 2012).

Another early electronic messaging system is documented in a report from the US National Research Council entitled ‘Electronic Message Systems for the U.S. Postal Service’ (NRCUSPSS Panel 1976). This was six years before the specification of Simple Mail Transport Protocol (SMTP) (Postel 1982) that now forms the basis for current forms of email over the Internet, enabled by the 1974 Internet Protocol suite (TCP/IP) (Cerf et al. 1974).

Prior to the advent of the Internet, a number of services offered both business and home users access to computational resources through time-sharing systems. Providers included companies such as CompuServe™ and General Electric Information Systems™. These systems were essentially private networks and offered, among other things, the capability for users to send messages to one another. For example, Apple Computer employed this facility internally in advance of the Internet back in 1986 as a combination of the General Electric Information Systems™ backend, and its own bespoke software, *AppleLink*™ (Barnes and Greller 1994, p. 131). Figure 5.1 provides a rendering of this early email system taken from the *AppleLink*™ user’s manual where electronic ‘Mail’ is a highlighted, metaphorically employing both an ‘In Basket’ and ‘Out Basket’ as central visual metaphors.

Concomitant to the rise of Internet usage as rendered in figure 5.2, major software and Internet companies also began offering free email services in the early 2000s, resulting in further entrenchment of email into daily life (Cusumano 2005, p. 17). This time frame corresponds to an important inflection point where a Pew survey (2014) shows the intersection of the number of Americans who use the internet exceeded those who did not. A graphic rendering of this survey is shown in figure 5.2.

To further underscore the ongoing significance of this inflection point, another Pew survey reports that in 2002, 55% of all Americans used email, while in 2011 this number grew to 70% (Purcell 2011). Crucially, in both surveys, email consistently scores at the top of the list for popular online activities, as shown in figure 5.3 (*ibid.*).

Thus, according to Purcell, email has long been a primary practice among US Internet users. Previous technology acceptance research (Davis et al. 1989; King and He 2006) further associates email with both ease-of-use and usefulness/perceived utility (Adams et

¹Time-sharing is an approach to shared computation that was popular in the 1960s, based on many users sharing the resources of one computer. This was traditionally accomplished through the use of terminals connected to mainframe teletype machines that, in addition to being connected by cable, could also be connected using an acoustic coupler, or modem (Fano and Corbató 1966). However, according to Fano and Corbató, time-sharing ‘does more than save time and money. It sets up a dialogue between user and machine and allows communication among users’ (*ibid.*, p. 129).

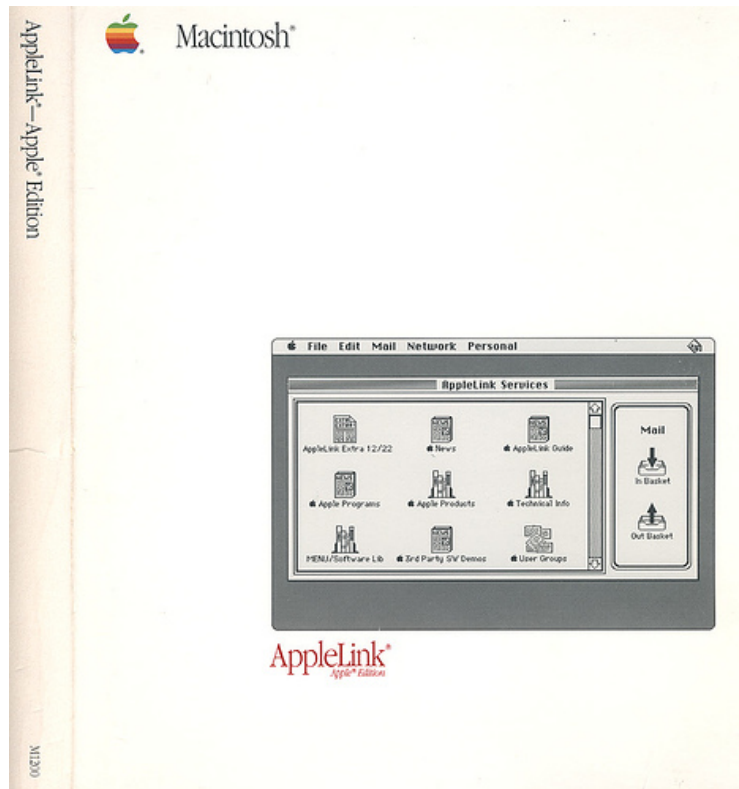


Figure 5.1: AppleLink™ User Manual Cover

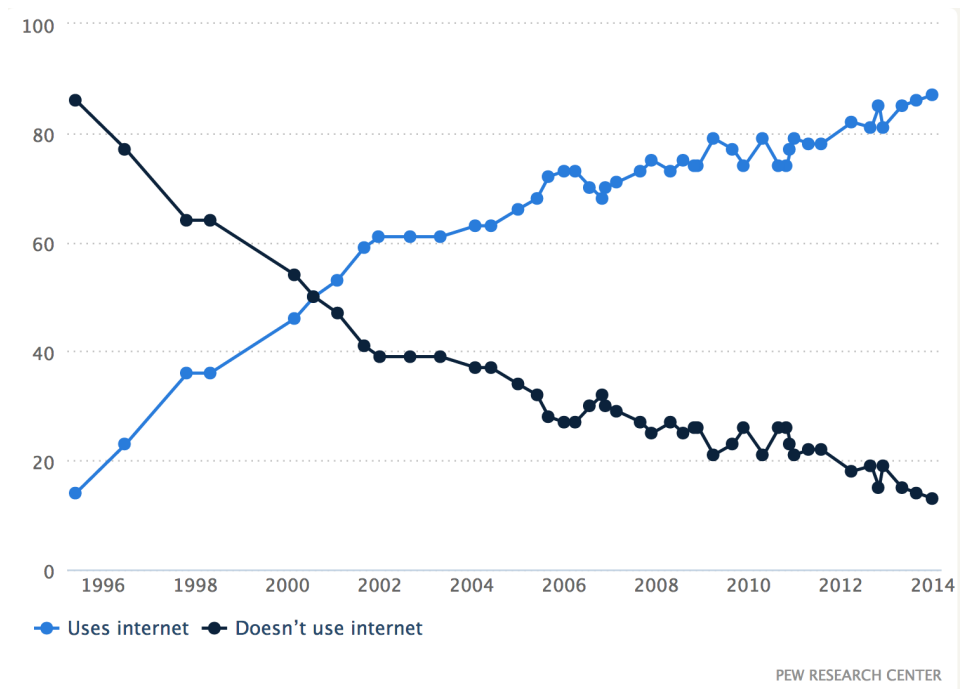


Figure 5.2: Internet Use 1996-2014 (Pew Internet 2014)

al. 1992, p. 233), which, along with additional moderators such as social (Karahanna and Limayem 2000; Venkatesh and Morris 2000) and cultural influence (Huang, Lu et al. 2003; Igbaria et al. 1995), offers a plausible, multivariate explanation for the acceptance and popularity of email as a ubiquitous practice. Given this ubiquity, it follows that an exploration of formal leader practices for ‘doing’ email are an important place to study the relationship between computational objects and leadership practice.

Over time, search and email are most popular online activities

% of internet users who do each activity

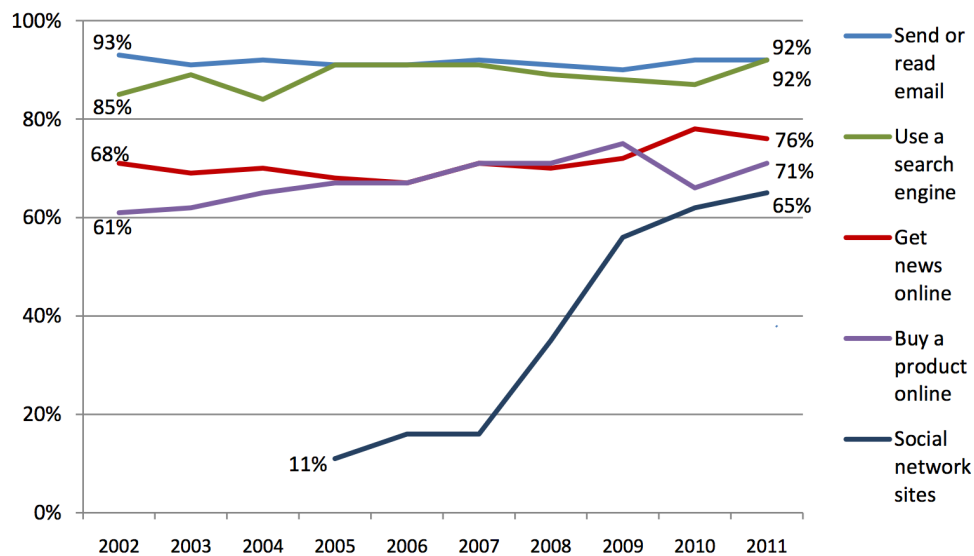


Figure 5.3: Top Online Activities 2002-2014 (Purcell 2011)

5.3 Findings: Email at Two Different Companies

With a practice as dominant as email which relies on a standardised infrastructure, one may presume that the way people use email is also fairly standardised. This would be a mistake. On this point, my field observations of formal leaders, their local human networks, and their engagements with computational objects serve as evidence that demonstrates such practices are being continually innovated on an ongoing basis within some organisations, arguably leading to new forms of leadership. In comparison, other data I have collected exposes alternative, more restricted practices in relation to email. By comparing these two sets of data, presented respectively as episode one and episode two, I construct a binary continuum that maps some of the choices leaders make about engaging with computational objects and, through this approach, shows that when formal leaders

engage in the practice of email, they do so in different fashions with very different kinds of collaborative engagements and organisational outcomes.

In other words, differences in material-discursive practices involving email produce different kinds of outcomes that are, in turn, cited through successive material-discursive practices to a formal leader *as leadership* through one or more of the five dimensions of leadership as depicted in figure 2.4 on page 32, as in the example of Cisco I presented in section 2.2.9.3 on page 38.

Specifically, I will show how some practices produce a much broader form of real-time computational engagement where the ‘doing’ (Nicolini, Gherardi et al. 2003, p. 21) of leadership practices is distributively enacted through an assemblage of sociotechnical humans and computational objects (Latour 1999, p. 159). Thus, my analysis will show that the enactment leadership is not accomplished solely by an individual, but rather, by a human and non-human network of actants (Latour 1992, p. 256). Moreover, I will continue to build on my argument that leadership is materialised through specific material-discursive practices where citations of one or more of the five dimensions of leadership, as depicted in figure 2.4 on page 32, are enacted.

5.3.1 Episode One: Email Up Close

In the following presentation of empirical material, I first draw upon field data compiled from the site Eta over a nine-month period. This presentation of the data supports a rich understanding of the emergence and ongoing change of an innovative leadership practice. It amply demonstrates how engagement with email evinces not only various dimensions from the fivefold leadership framework as depicted in figure 2.4 on page 32, but empirically supports claims for a form of leadership that is both enacted and distributed through networks of people and computational objects.

The empirical presentation follows Sebastian, Eta’s COO, his executive assistant (EA) Ruby, and their computational objects through various temporal phases of relationship where an innovative leadership practice emerges with seemingly positive effects.² The site of such material-discursive practice is fertile ground for a process Barad refers to as *iterative intra-activity*, where connections, differences, and commitments are (re)made (2007, pp. 392-393).

5.3.1.1 Discovering the Practice

Prior to physically observing Sebastian, I had a number of Skype™ interviews and conversations with him. During one of these, he mentioned he was trying out a practice of

²Background information regarding Eta is located in section 3.3.1. Section 3.3.1.1 contains additional background information on Sebastian, while background information on Ruby can be found in section 3.3.1.2.

not checking his work email during weekends (field diary 19 Mar 2013).³

Thus, on my first day observing Sebastian, I asked him how his practice of abstaining from email over weekends was going. He answered ‘very well’, and eagerly proceeded to show me his inbox, which had no more than 20 emails.⁴

He further explained that he had developed a relationship with his executive assistant (EA) whereby she has full access to his email, archives or deletes items that are unimportant, responds to those items that she can on his behalf, and drafts email responses on his behalf, leaving them in his draft folder. He then showed me the drafts folder, which had about 10 works-in-progress (field diary 03 May 2013).⁵ At this stage, I considered what Sebastian was showing to me anomalous, having shadowed a number of other C-level executives as well as interviewing many more whose inboxes regularly contained several hundred unread emails. I was therefore surprised to encounter such a meagre inbox.

5.3.1.2 Origins of the Practice

The following week, I shadowed Ruby and she shared with me further details of their practice and offered her perspective on how it emerged. She first explained to me how she lays out the screens of her multiple computational objects in order to focus her work at her desk. As shown in figure 5.4, Ruby’s standard setup consists of two computers and a total of three browser windows. On the left computer is Sebastian’s calendar. On the main screen, Ruby’s email is on the left and Sebastian’s is on the right rendered as two windows.

Crucially, she was effectively logged in as Sebastian.⁶ The implication here is that email respondents have no indication that Ruby may be responding on Sebastian’s behalf. For this reason, I also asked Ruby if she monitors his instant messagings (IMs), another feature of the Google Apps™ platform. She said that she does, and added that when he is busy, she will often respond for him. Ruby also indicated that she is responsible for ‘managing’ his calendar and that one of her core responsibilities is ensuring that Sebastian’s time is ‘protected’ (field diary 08 May 2013).

³This was approximately two years after Volkswagen had publicly announced its decision to stop its servers from sending emails to some of its employees when they were not on duty (BBC 2011) and may therefore be an instance of the type of practice diffusion that Ansari et al. describe (2010).

⁴Like many of the sites I observed, Eta uses Google Apps™ through which a suite of information and communication technology (ICT) services are made available across an array of computational objects. Of the six different companies I had observational access to, 50% of them used the Google Apps™ platform. Those three sites also happened to be the largest and most successful companies included in the study.

⁵My field notes show that at the point where Sebastian made these remarks I also wrote the following: ‘Look into shadowing Ruby’ (field diary 03 May 2013). In making such notes and following up on these promptly as the research progressed, Alvesson’s ‘situational focus’ (1996, p. 201) as well as Latour’s tracing networks of people and objects was achieved (1999, p. 24).

⁶Technically, this was accomplished through *delegation* (Google 2011).



Figure 5.4: Anonymised Image of Ruby's Desk

I then asked her how she came to work with him so closely on email, and how she is able to make decisions on his behalf. She asserted that 'a good EA can judge what needs to be delegated' (*ibid.*), suggesting a form of self-assignment, where Ruby anticipates Sebastian's needs without Sebastian necessarily (ever) articulating them.

Offering further context, she explained that she was hired at [Eta](#) when Sebastian began as COO, which also coincided with his return from paternity leave after the birth of a child. Thus, not only was Sebastian starting a new role, but had also been out of the office for some time—and for these reasons had a particularly significant backlog of email.

At that time, she explained, he had more than 300 unread emails. She recalled him telling her that he was anxious about this and did not know how to approach the issue. In response, she offered to read the messages for him and let him know what she thought was important. To further support this activity, she says she met with all department heads in her first week to understand what they do, what their relationships were with Sebastian, and what their needs were. As part of these activities, Ruby reported that she additionally took time to communicate with 'remote people.' (field diary 08 May 2013) According to Ruby, meeting with all of these people took about a week.

After confirming that he wanted help with this backlog, Ruby read his email and then filed it into three categories: 'important', 'not sure', and 'not important'. This gave her a way to check the categorisation with Sebastian. As he confirmed her judgement over time, this formal categorisation gave way to a simpler system, where urgent messages

received a ‘star’ (Google 2013b).

Other factors have also impacted the way Ruby manages Sebastian’s email. For example, after some time in his new roles as COO, Sebastian proposed a practice around maintaining a *zero inbox* (Mann 2006). In this practice, email that has been read and which has been responded to or requires no response is *archived*,⁷ leaving the inbox empty. Thus, the only email in the Sebastian’s inbox consists of those emails that have either not been read or those for which a response has been deemed necessary, in many cases, by Ruby, but also by Sebastian. This material-discursive practice explicitly broadens the interaction paradigm with email from a purely communicative medium to one where each item in the inbox is now something to be explicitly decided upon and actioned in some meaningful way. In other words, through the material-discursive practice of *zero inbox* (*ibid.*), Sebastian’s inbox is enacted as a site for an ongoing stream of decisions which Sebastian and Ruby make in tandem.⁸

Thus, Ruby, the EA, regularly makes decisions on behalf of the COO, Sebastian, that include her archiving what she feels he does not need to read. She concedes here that this practice is imperfect. For example, she explained to me that the director of marketing contacted her about an email sent to Sebastian to which no response was received. Ruby was able to find this email, which had been archived; she presumed Sebastian read it and inadvertently archived it.

Ruby also actively drafts emails on behalf of Sebastian, some of which she sends on his behalf without seeking his approval. For example, Ruby explains that while Sebastian was recently on holiday she ‘wrote a bunch of drafts’ (field diary 08 May 2013) for him. She points here to a broader collaboration with the executive team where, for example, a member of this team recently wrote an email to Sebastian but sent it directly to *Ruby* rather than Sebastian for further editing and review. She then edited this email which was eventually edited and sent to the entire company by Sebastian. Ruby also asserts that there are cases where she prepares a response and sends it without seeking Sebastian’s approval, making clear that such latitude is prefaced on a level of trust that was granted

⁷ Archiving email is available in various forms, on a variety of email clients, however, it has a specific meaning and associated function within the context of the *Google Apps™* platform used at *Eta*. Specifically, archiving a message moves it from the ‘inbox’ to the ‘all mail’ container. An archived message is still available within what can be considered a meta-folder where all of the user’s mail resides, but no longer appears in the ‘inbox’. For further information on this feature and its implementation within *Google Apps™*, see <https://support.google.com/mail/answer/6576>.

⁸ The *zero inbox* (Mann 2006) approach to email is far from novel; HCI researchers have also explored email as a task management system. For example Bellotti et al. noted in their literature review that ‘dealing with email and managing tasks and projects are indistinguishable’ (2003, p. 345) and used this assertion as their inspiration to design an email interface specifically for task management purposes. *Zero inbox*, however, addresses this concern through alternative means. Yet, Bellotti et al.’s assertion, linking email to task and project management, already encroaches on the realm of leadership, for those often referred to as ‘project leaders’ are those responsible for managing/leading projects.

by Sebastian over a period of their nine months of working together. I asked her if this kind of collaboration is something she has experienced in previous positions. She said that it was not.

5.3.1.3 Observing the Practice

A couple of days later I was shadowing Sebastian again for a very full day of appointments. Around 3:15 p.m., Sebastian and I are alone in his office for a short period where he is writing a company blog post to announce some company-wide changes, a task for which he has engaged me in support. In about 10 minutes, we have developed all of the points he wants to make in a form Sebastian is satisfied with.

It's now 3:30 p.m., and the next appointment on Sebastian's calendar is 'email review'. For this appointment, Ruby comes in with her laptop in with her. As she walks in, Sebastian asks her to complete the writing of the blog post from the points we just worked up. Sebastian tells her that he would like to review the revised version again before it is published on his blog. Ruby acknowledges all of this and proceeds to sit next to Sebastian at his desk, placing her computer next to his. Both of them have their computers pointed to his email.

To begin, Sebastian selects an urgent message from his inbox of about 15 emails. He explains his rationale to Ruby regarding the email with the implicit instruction for Ruby to respond to it. She does.

The email is about some upcoming appointments. Looking at his calendar, Ruby reviews these appointments verbally with Sebastian. She says she is going to send one of the attendees a meeting email. At this juncture, Sebastian enters into an informal conversation with Ruby while she works on the email, relating a social event to Ruby that Sebastian was present at, but Ruby was not. The story is told in a style that implies she missed something very amusing. Ruby laughs and makes a jovial retort.

Now Sebastian is looking at another email that has an attachment. He saves the attachment to his local disk and then opens it. Meanwhile Ruby, looking at a different email, says 'What is this update on the [name of business opportunity] thing?' Sebastian answers, 'They want to switch to [name of technology]. [Eta](#) would then build the apps for their [name of another technology]' (*ibid.*). This seems to be sufficient for Ruby to go ahead and respond to the email and she does so.

Next, Sebastian has opened a Google Sheets™ spreadsheet from another email and is reviewing sales data that has been made available. After a minute or so, Sebastian starts to write a response to the email. For a few moments, there is no conversation between Sebastian and Ruby. He is writing one email on his screen while Ruby silently writes another on hers.

This moment of silence is when the idea of *pair emailing*, as a natural extension of Eta's pair programming practice, first comes to mind. It does not, however, appear that Sebastian is explicitly applying pair programming to his work practice. Rather, the practice emerges through 'circuits and cycles of interdependency' (Pantzar and Shove 2010, p. 459), including, among many, the use of pair programming at Eta, his appointment as COO, the arrival of Ruby as his EA, her initial offer to help with his email, a trust between them that subsequently grew over time, and Sebastian's decision to pursue a *zero inbox* (Mann 2006) policy. Breaking the silence, Sebastian continues with informal conversation.

Sebastian has now sent an email and turns his attention to a draft email Ruby has prepared earlier on alerting the directors to a set of staff members who have been added to an internal system. A verbal discussion among the three of us on the wording of this email ensues. Then there is silence again. Ruby continues writing one email while Sebastian works on another. Sebastian completes his email and then reviews the inbox, at which point a new email arrives. Expressing displeasure, he says 'another one just arrived' (*ibid.*). He immediately sets to respond to this new email.

As each email in Sebastian's inbox is sent, it is archived and the number of messages in the inbox is slowly dwindling. Sebastian briefly looks a web site for a golf tournament online and tells us 'Tiger is in second place' (*ibid.*). Ruby then asks him about another email. 'You can answer it,' he says, and proceeds to provide her background, including decision points that go into his thinking (*ibid.*). Here Sebastian is not telling Ruby what to say, but rather what he thinks, and seems to be comfortable that with this direction, Ruby will know what to say.

Someone else emails Ruby directly (to her email account, not Sebastian's) about whether she has 'circled back' with Sebastian yet and she verbally alerts Sebastian to this (*ibid.*). Sebastian responds to this query through an already existing thread in his inbox.⁹

Then Sebastian goes on to another email about receivables. He responds at the top of the thread and directly to the sender rather than to the entire group to whom it was initially sent. This comes across as a particular rhetorical strategy. It signals a response to a particular temporal location in the conversation and by virtue of Sebastian's direct reply, suggests a specific intent. Brightly, Sebastian says 'Twelve emails left!' (*ibid.*) Ten minutes have passed since Ruby entered the room.

The practice continues in this fashion for more than two hours. At 5:50 p.m., I note there are three messages left in his inbox. There is some discussion between them on an email about organisational practice management. They are looking at the same email on both screens. There is an attachment to the email—an Eta executive meeting slide deck.

⁹A 'thread' refers to a single message within a group of messages that are, in turn, replies to an initial message that are grouped together by the email client. Such groupings, within Google Apps™ are referred to as 'conversations'. For more information, see <https://support.google.com/mail/answer/5900>.

Ruby has opened this and is reviewing it. Sebastian switches over to the draft email view. There are three draft messages. Sebastian comments to me that ‘these slip under the radar because they are drafts’ (*ibid.*). Then Sebastian looks over at his inbox and two more emails have arrived, raising the total to five emails.

At 18:00, Sebastian says he has to go. We stop, with one email in his inbox and four drafts left. It is the end of the working day, and we all say good-bye.

After I leave Sebastian’s office, I wrote the following in my field diary:

What I have observed here is part of a larger process where conversations turn into notes that are repeated in other conversations that themselves turn into more notes—in draft emails that are then sometimes reviewed in greater depth—as the writing process progresses. These finally achieve a ‘sent’ state to become part of the company’s discursive communication record (field diary 10 May 2013).

5.3.2 Analysis: Episode One—Where is the leadership?

Having a historical perspective from Sebastian and Ruby on how they view the development of their working relationship together (and with their computational objects) provides a useful starting place to challenge traditional assumptions of leadership and generate an insightful account (Miettinen et al. 2010, p. 1321; Park 2008, p. 394; Susi 2007). First, the episode provides compelling evidence that the practice of engaging with the COO’s email through pair emailing grew out of an ongoing series of engagements and a growing sense of trust between Sebastian and Ruby that was independently given voice by each of them.

For example, Sebastian said at one point that:

Ruby is an incredibly capable person. She could do any executive job she wanted to here at [Eta](#). She is an executive assistant (EA) because that is what she wants to be (field diary 15 May 2013).

Sebastian’s assertion invests a great deal in Ruby’s abilities. Moreover, he explicitly views her level of capability as a peer when asserting that she could do any job at [Eta](#) and qualifies her role as EA as a choice she has made rather than a level of employment based on her ability. He evidently sees those abilities as above and beyond the level of EA.

Similarly, Ruby invests a certain trust in Sebastian and in [Eta](#) as an organisation. This is revealed to some degree in her own comparison of working at [Eta](#) to her previous EA role elsewhere. In this vein, Ruby asserts generally that she is treated with much more respect at [Eta](#) than with the previous company (field diary 01 May 2013). For example, she tells me that:

[T]he culture here is much more respectful of your personal life. At my previous company, there were a lot of younger people with no kids, so no one cared if you had a family. Here, there is a good balance of younger and older (field diary 08 May 2013).

Thus, Ruby calls out particular values she perceives as being embodied at [Eta](#) and therefore contribute to making [Eta](#) an improvement over her previous job. More specifically, however, she also identifies Sebastian’s ‘thoughtfulness’ as a factor contributing to her positive view of working at [Eta](#), which I take to mean not only her perception of Sebastian treating her in a way she would like to be treated, but also a respect directed towards him in recognition of what she sees as his intelligence and vision. I make these latter claims based on her overall engagement with Sebastian and the ongoing stream of ideas he offers her, which, as I’ve noted above, are generally not in the form of commands, but rather framed as the sharing of a perspective with which she is entrusted to work on her own. In her appreciation for this thoughtfulness, however, there is also an implicit expectation; she expects or trusts that he will continue to treat her this way.

I call attention to these expressions *mutual trust* and *respect* as they highlight the dynamics of two peers working with each other rather than denoting a statically fixed leader and follower.¹⁰ For there are clearly ways that Ruby takes a leadership role over Sebastian and vice-versa. Functionally, this dynamism appears to be based on the distribution of labour between them and the ways in which they employ computational objects to accomplish their work. Indeed, it is through this distribution of labour that it becomes much easier to see forms of leadership in action as it flows from person to computational object and back again.

For example, the reader will recall that in addition to the complete access Ruby has to Sebastian’s email that she also has unrestricted access to his calendar. In fact, Ruby, consistent with a role fulfilled by many EAs, is *responsible* for Sebastian’s calendar (Muller and Gruen 2005, p. 115). In this role, Ruby states that she:

[L]ike[s] to manage the calendar tightly to maintain open space and manoeuvring room. I will fill open slots with buffer so that I can manage the incoming requests. Otherwise, I have nothing in my back pocket (field diary 08 May 2013).

Thus, one of Ruby’s domains of responsibility can be understood in terms of the dimensions of leadership as depicted in figure 2.4 on page 32. This includes a clearly

¹⁰Notwithstanding, I would be remiss were I not to point out that there exists ample evidence claiming that *mutual trust* is also essential for effective leader-follower relations. See, for example, Bligh and Kohles 2013; Kramer 2011; Yang and Mossholder 2009.

defined *positional* space where she exercises *processual* control in the oversight of Sebastian's calendar. To this end, she has developed particular strategies in pursuit of specific *results*—'open spaces and manoeuvring room'—by deliberately placing mock appointments in Sebastian's calendar, so that colleagues within *Eta*, who can view Sebastian's free and busy slots, are thereby limited by the open slots presented to them as viable availability for Sebastian's time. Such practices also include what leadership scholars refer to as decision-making (Useem 2010a) and the influencing of resource allocation (Yukl 2009, pp. 8-9) which, for them, are constitutive elements of leadership.

Moreover, this particular strategy also reveals something about Ruby's relationship with and dependence on the computational object. For, though she has not articulated it explicitly, Ruby's material-discursive practice around Sebastian's calendar reveals that she understands that colleagues can view Sebastian's calendar through their own computational objects and make use of his free and busy times as rendered on their screens to make choices about requests for appointments.

Ruby has thus developed a strategy of artificially filling Sebastian's calendar with dummy appointments as a means to present a view to potential requesters that provides her with greater organisational power or leverage, a tactic which she referred to with the metaphor of keeping something in her 'back pocket'. This places the computational object in the role of accomplice to Ruby in presenting a particular 'reality' to others and in this sense one could also reasonably say that Ruby is, by controlling the computational object, leading it to do her bidding, thereby achieving specific *results* as depicted in figure 2.4 on page 32.

However, the possibilities for leadership do not end here. It is also the case that Ruby is simultaneously led by the computational object in the sense that her participation requires that she follow certain steps in order to maintain a calendar. These include creating and updating calendar items on Sebastian's calendar and adding attendees and resources such as meeting rooms and/or Google Hangout™ connections for remote attendees. It also includes responding to emails that contain incoming calendar requests. In other words, by participating in a rule-based, structured system through her computational objects, she is subject to its mechanisms and must work within these by following particular steps. Following Orlikowski here, the computational object *choreographs* (1996, p. 65) her activities in all of these aspects; Ruby is thus led by the computational object to accomplish such tasks through mail notifications, calendar alerts, and other computational mechanisms.

Thus, more than being a mere embodiment of leadership through control (Grint 2005b, p. 1477), Ruby's calendar activities are also an example of a set of interdependencies that define a sociotechnical system (Rice 1953; Trist and Bamforth 1951), where it is not

simply the automating or computational aspects of the system that constitute it. There are also social aspects at play here, perhaps most notably Ruby's subterfuge to present the appearance of a calendar that is more full than it actually is in order to achieve the desired *results*—control over Sebastian's calendar. This discursive aspect can also be categorised as being comprised of a distinctly human intelligence, one that is required for the ongoing intended operation of the system. This human dimension, as I will continue to show, often plays a critical role in the constitution of both leadership practices and the associated roles played by computational objects in their enactments.

Most importantly, Sebastian openly acknowledges Ruby's authority over his calendar and the management of his time at [Eta](#). For example, when asked by a subordinate if he has time available to meet in future, Sebastian responded, gesturing to Ruby, 'You'll have to ask my boss' (field diary 25 Nov 2013). While perhaps in some ways joking, Sebastian is nonetheless reinforcing through humour (Meyer 1997, p. 202) what I had previously observed; Ruby holds a position of authority over Sebastian's calendar. Here the word 'boss' cites that Sebastian is *positionally* subordinate to Ruby. It is no far stretch to suggest that Sebastian acknowledges that Ruby takes a leadership role with respect to his calendar and, in this exchange, Sebastian makes clear that he knows this. Sebastian's assertions merely show, as in the analysis in the previous chapter, that members make use of the dimensions of leadership as depicted in figure 2.4 on page 32 in order to cite certain material-discursive practices and people with the connotation of leader, thus materialising leadership *in practice*.

Furthermore, Ruby is also responsible for tracking and entering how much time Sebastian spends on particular classes of activity in his role as COO within an internal system at [Eta](#) used for tracking the use of time for particular human resources within the company. Such data is collected as part of the organisation's larger efforts to quantify its own use of time in its ongoing planning and execution of strategy. However, as with Ruby's control of Sebastian's calendar, it is *Ruby* who makes the determination of what data to enter into this system and thus formalises, for the company's records, Sebastian's use of time on [Eta](#)'s behalf.

Consequently, one of the key points I wish to make about the location of leadership in the various exchanges between Ruby, Sebastian, and their computational objects is that what counts as leadership must be evaluated in terms of a Taylorian division of labour (Grint 2011, p. 8, 2010a, p. 41). In other words, leadership must be considered with respect not only to the degree of authority and responsibility an individual holds for a task, but in addition, must also lie to some extent with who—or what (as I have explained above in the case of the computational object *choreographing* [Orlikowski 1996, p. 65] Ruby's activity)—determines those divisions or boundaries.

Applying these ideas diffractively (Barad 2007, pp. 86-94; Nicolini and Roe 2014) to the empirical material presented in episode one, when we look at the *kinds* of emails Ruby responds to on behalf of Sebastian, Ruby does not reply indiscriminately to all messages on his behalf. For example, I did not observe her responding to emails containing budget requests or seeking the approval of a new hire, although I did see her review such messages and pass over them, leaving them in Sebastian's inbox for his review. Instead, Ruby responded *as* Sebastian for a different class of requests which would certainly include requests for appointments from people outside of *Eta* and she would archive those messages she deemed unimportant. This raises the question of what the boundaries are.

Here, the evidence suggests that Sebastian has a hierarchical form of control (Chandler 1977, pp. 1-2; Miner 1975, pp. 201-204) to define Ruby's boundaries by virtue of his titular role, or *position*, as depicted in figure 2.4 on page 32. This relationship is reflected, for example, in the way Ruby initially offered to categorise Sebastian's email on his return from paternity leave. Ruby offered this as a suggestion, from which Sebastian was offered the right of decision (Useem 2010a, p. 510). I suggest here that Ruby's offering this right of decision is one way that leadership is materialised in material-discursive practice. Thus, when offering a decision to another, the one offering the choice becomes subordinate to the one making the decision. By offering Sebastian a decision about what she should do, Ruby implicitly played the role of follower, for if Sebastian had said he was not comfortable with Ruby categorising his email, it is highly unlikely that she would have done so. By deferring to Sebastian, Ruby signals both to him and to the world-at-large her recognition of his role, or *position*, as depicted in figure 2.4 on page 32.

However, Sebastian *did* decide in favour of Ruby's proposal and was subsequently comfortable with the manner in which she categorised his email. This, according to the narratives offered by both Sebastian and Ruby, led to other developments that resulted in further divisions of labour between Sebastian and Ruby which are now well established as part of their working practice. These include Ruby drafting emails on Sebastian's behalf, Ruby sending some emails on Sebastian's behalf without explicitly checking with him in advance, and other executive team members sending Ruby emails directly that are meant for Sebastian. All of these, to some extent, blur the boundary of leadership authority. These empirics therefore demonstrate that it is not always clear *who* is actually responding to Sebastian's email. From the recipient's perspective, all emails coming from Sebastian are from the COO, but what begins to emerge, when the minute details of the production of those messages are taken into account, is an understanding that the leadership activities of the COO are both computationally and geographically dispersed across a range of people and computational objects for their accomplishment. This kind of dispersal, often associated with computational technology, is far from new within work-

place studies (O'Mahony and Barley 1999; Zuboff 1988, p. 243), however, that its effects are linked specifically to leadership practices as they are in this study is a novel finding within the context of the extant leadership literature.

Even I was drawn into this network of production. As described above, while I was in Sebastian's office, before Ruby came in to begin the pair emailing session, Sebastian enrolled my assistance in writing a blog post that was intended as a formal company-wide announcement. In this experience, my expertise as a writer was sought, but the points to be made were already clear to Sebastian. He knew what he wanted to say but wanted assistance in saying it. Put differently, Sebastian had the substance and saw my skills as offering additional style. The former is a distinctive contribution and commonly associated with the ideological vision of the leader who engages his subordinates in accomplishing the work to be done (Grint 2005a, p. 33; Ladkin 2010, pp. 101-126; Shamir et al. 1993, p. 585).

Meanwhile, the role of the computational object in this engagement was transparent in service of the task, but was nevertheless present. Using Google Docs™, we employed the services of the computational object in a dual role of recording and reflecting our thinking, as discussed between us, by then typing alphanumeric symbols on a keyboard, which were then converted to binary symbols and stored on Google servers somewhere on the planet in triplicate (Ghemawat et al. 2003, p. 30), and then represented back on the screen as alphanumerics. This role of the computational object as a combination of a recorder and representational or projective device is so commonly employed that it is hardly ever noticed, however, without it, the practice would have been significantly different on a number of levels, as studies on the cognitive effects of word processing clearly demonstrate (Haas 1989; Joram et al. 2008).

In a similar fashion, many of the material-discursive practices I witnessed were dependent on the existence of computational objects and the infrastructures behind them to accomplish everyday work. Without these in place, the enactments cited as leadership that I witnessed would have been materially and substantively different. Thus, particular enactments of leadership are revealed here to be constituted to some degree by the *computational context* in which they are performed. Were, for example, Sebastian and Ruby to be working with parchment and ink rather than computational objects, it is fair to say that both the practice and its various outcomes would be substantially different, for as Carlile notes, artefacts are 'consequential' (2006, p. 101). Taking another example, the temporal dynamics that result from the virtually instantaneous indexing and retrieval of e-mail message content available through Google Apps™ as well as the facility for instant messaging (IM) both extend the reach of the already communicative activity embedded in the practice of pair emailing. Crucially, all of these support alternative modes of thought (Coyne 1995, p. 132; Rheingold 2000, pp. 132-151), specifically in its rhizomatic expression

(Coyne 2008, p. 552). Put simply, the practice would likely be more linear without the support of computational objects, however, through them, modes of lateral or divergent thought become increasingly available to the humans that interact with them (Bono 1969), a capability recognised as beneficial to those in leadership positions (Garratt 2007; Hughes 2011; Jung 2001).

After Sebastian and I worked on developing the points he wished to make, in an additional act of delegation, Sebastian asked Ruby to review what we had written and stored in the Google Docs™ system, to work towards finalising the language, and to return it to him for a final review before she made the post available company-wide. The role of the computational object here is analogous to a filing cabinet but entails more than that. For example, it is implicit that when Ruby later works on the draft of the blog post, she too will draw on the computational object's recording and representative capabilities. This dynamism, in terms of the computational object's ability to play multiple roles simultaneously, is common—and by design (Gaver 1991; MacLean et al. 1990; Silberschatz et al. 2010, pp. 14-19). However, from the human perspective, it is reasonable to propose that within these material-discursive practices, Sebastian is orchestrating various forms of delegation and empowerment, an activity closely associated with individuals in leadership positions (Yukl 2009, pp. 103-116) and in which lies the basis for the division of labour. Thus, it can be suggested that Sebastian is often leading through delegation, both through humans *and* computational objects.

Another way that pair emailing can be understood as a site for leadership practice is by drawing attention to the *results* (see figure 2.4 on page 32) it produces. Here, Sebastian's email is a crucial site for the official communications of the COO. As such, it contains sensitive and strategic information regarding company finances, hiring, customer engagements, company-wide policy announcements, and other such subject areas relating directly to the company's central authority. A significant number of emails that garner responses are requests for some sort of approval, thus supporting the claim that Sebastian's email is a site for ongoing leadership decision-making (Useem 2010a, p. 510). Such decisions are a manifestation of the leadership authority prefaced on the formalised *position* (see figure 2.4 on page 32) of the COO. On this basis, pair emailing becomes a principal site for leadership practice at *Eta*.

Beyond this, there are additional phenomena to consider. First, when Ruby started working at *Eta* she reported that Sebastian had a backlog of over 300 messages. However, during the initial phase of my observations, this queue was in the range of three to 40 messages. At the low end then, this represents a reduction of the COO's formal communication backlog by at least 86% and up to 99%. Such a reduction and its continued maintenance at a significantly lower level implies that leadership decisions are being taken at an improved

level of efficiency. This phenomenon of ‘leadership efficiency’ arising from the particular arrangements of humans, computational objects, and material-discursive practices is perhaps best described as a cyborgian hybrid where, as noted in the previous chapter:

[S]ocial relationships get congealed into and taken for decontextualized things [...and where] social relationships include non-humans as well as humans as socially [...] active partners (Haraway 1997, p. 8).

Thus, from this perspective, there is no way to decouple any phenomenon of ‘leadership’ that may be present from the apparatuses of humans and computational objects that are also present in the context. This is why Barad suggests:

The boundary between ‘the object of observation’ and ‘the agencies of observation’ is indeterminate in the absence of a specific physical arrangement of the apparatus (italics in original, 2007, p. 114).

I would further suggest that there is also an aspect of *purpose* (see figure 2.4 on page 32) present here. Specifically, since Sebastian made the decision to introduce the *zero inbox* practice to his work, it follows that he had some purpose in doing so, and it is likely that this purpose relates in some way to his idealisation of how he would like to function (effectively) as a leader. Even without knowing specifically what the purpose or purposes might be, this is a reasonable inference to make.

Another striking feature of this computationally centric leadership practice was the presence of an ongoing verbal conversation between Sebastian and Ruby.¹¹ By perpetually engaging in various kinds of verbal and computationally-supported conversations (exploratory, visionary, operational, social, and so forth), the unfolding narrative of the company is simultaneously *imagined* as ideas are developed in conversation and *enacted* as material-discursive practices (such as decision-making and formal communications) later (possibly) realised as leadership accomplishments (Nicolini and Meznar 1995, p. 727; Czarniawska and Joerges 1996, pp. 32-33).

Thus, I submit that the functionality of the computational object contributes to the maintenance of a dialogic space (Caronia and Cooren 2014) by enabling the possibility for very quick interactions with almost immediate feedback, allowing for these interactions to sit alongside verbal conversations and run in parallel with them. For example, it is

¹¹More generally, the role of verbal conversation was observed to be elemental to this COO’s overall leadership practice. One way to summarise this is that the COO’s role is both *performative* (cf. Alvesson and Spicer 2012; Barad 2003; Case and Piñeiro 2006) and *improvisational* (cf. Orlikowski 1996; Weick 2002; Whalen et al. 2002). See also Boden’s ethnomethodological thesis of organisations being constituted through various forms of talk, especially her suggestion that with the rise of computational objects in the workplace, electronic conversations must also be considered (1994, p. 209).

possible for Sebastian to ask Ruby about an email regarding and upcoming appointment conversationally. In response to this, she can review the message while he is speaking to her and then open an IM window, spawning another conversation with the attendee in question and determine that person's availability in real-time. She is then able to respond to Sebastian in a time frame that enables the verbal conversation between them to continue normally. The ongoing human-to-human conversation between Sebastian and Ruby is thereby sustained by the capabilities of the computational object. If instead, Ruby had to use a telephone or physically get up and vacate the office in order to check with the attendee, the dialogic space would have been disrupted. In this fashion, the dialogic space observed in pair emailing can be understood as a layer that rests on top of the computational layer of capability. Keep in mind, however, that conversations are occurring both in physical and virtual spaces. It is also the case that many of the emails that both Sebastian and Ruby work on are themselves ongoing conversations in their own right.

This multi-threaded reality is exemplified when Sebastian opens a Google Docs™ - spreadsheet attachment to an email. He does so to familiarise himself with further details of the request being made in its parent email. His response to that email is itself an asynchronous conversational enactment taken from the perspective of the COO; Sebastian is writing as the formal authority in this matter and gives a decision and his reasons for that decision in his response. That this conversation happens to occur in an asynchronous virtual space does not lessen the continuance of the dialogic mode. Quite the contrary: I would argue that Ruby's physical presence and the availability of face-to-face dialogue enhances the overall dialogic experience, centring the leadership practice of pair emailing firmly on the ground of human-to-human conversation.

During this phase of observation, which continued until the end of June 2013, the leadership practice of pair emailing was enacted regularly in this fashion and was seen to contribute to the general capability of the COO role to lead, manage, and respond to organisational concerns.

5.3.3 Episode Two: Email at a Distance

This next episode stands in stark contrast to the previous. What I now set forth depicts a very different form of engagement with computational objects and email, where the leader takes a much more isolated and individual approach. It is an approach that is backed-up by the clearest of business logic, however, like all decisions, by including some things it must also exclude others (Barad 2007, p. 179). Unfortunately, such exclusions are not always visible (Suchman 1995; Szymanski and Whalen 2011b). However, by bringing these exclusions to light, I attend to something inherent in all leadership decisions: the *trade-off* (Grint and Jackson 2010, p. 353). Here, I show how such decisions, sometimes unknow-

ingly, include choices about engagement with computational objects that have a material impact on leadership outcomes.

The empirical case follows Marilyn, the CEO of [Epsilon](#) and her use of email. It is also informed by interviews with her executive team in terms of their perceptions of Marilyn as a CEO in general and their observations regarding her use of email in particular.¹²

5.3.3.1 Discovering the practice

During my interview with Marilyn, we discussed a number of topics, including how she came to an understanding of leadership, how she came to an understanding of computational technology, and a discussion of the kinds of practices she found important to her leadership practice.¹³

At a certain point in our interview, I asked Marilyn about her own use of computational technology within the organisation:

INFORMANT: Me myself? Hmm, well I would say from a work perspective, I would say I spend 80 to 90 percent of my day in, kind of, either group meetings or one-on-one meetings. I spend most of my time on the computer, either after-hours or some other time, which is probably a frustration for people who are always trying to get in touch with me. Right now I get back to people on email but if I get email all day I wouldn't—I'd feel like I wouldn't be running the company, you know?

INTERVIEWER: No I completely get it. It's like there's this lived experience of being in the company and being there physically, presently—that's very important to your leadership style.

INFORMANT: Right, so I can't be sitting behind the computer getting every email returned immediately, so I'm always trying to figure that [laughter] out but I spent all weekend this morning—all weekend—because I have probably three weeks of emails that I glance at them, I look at them, I take my iPhone™ out, is this urgent, you know? I mean I try to triage the emails but I mean in terms of processing all of them, that doesn't really happen very much at the office. It happens on planes. It happens from home. It happens early in the morning, late at night so it still becomes a big part of how I do anything, so I would say I'm very involved in technology, however

¹²Background information on [Epsilon](#) is located in section 3.3.2.

¹³For further details on the content of these sensitising interviews, see section 3.1.3.3 on page 94.

it comes to me through other people, through how they do their work, you know, probably more so than just me as one individual (Interview with 1005 26 March 2012).

5.3.4 Analysis: Episode Two

Even in this very short excerpt, there are both similarities and differences to the first episode depicting Sebastian and Ruby. Specifically, the previous case shows the importance of the relationship between Sebastian and Ruby in the way the emails are handled; the present case also highlights the importance of relationships between the Marilyn and her followers as indicated by her focus on group and one-on-one meetings.

So while there is a similarity in both Sebastian and Marilyn's focus on human relationships, there exists a vastly different orientation to computational objects. Marilyn attests that she spends between 80 and 90% of her time in face-to-face engagements. While she indicates an awareness that her minimal engagement with computational objects are likely a cause for frustration with 'people who are always trying to get in touch'; she does not see this as a problem for the principal reason that if she did spend more time working on computational objects, 'I'd feel like I wouldn't be running the company.' Thus, Marilyn's conception of her *identity* as a leader is to some degree in conflict with choices she makes regarding her use of computational objects (Friedland 2006, pp. 37-39).

And yet, Marilyn *is* working with computational objects—just not at work. Instead, she reports that she spends weekends ('all weekend'), early mornings, and late nights in off-site locations such as her home and on airplanes to engage with computational objects. Put differently, her use of computational objects for any sort of leadership practice has been slotted in what I would term 'in-between' times and places. In Goffman's terminology, Marilyn's use of computational objects would be classified as occurring *backstage* (1956, p. 69). The result is that in choosing not to engage with computational objects on the *front stage* (*ibid.*, pp. 13-19) in her role of CEO, she nevertheless finds herself engaging with computational objects in these in-between times and places, a location defined by Goffman as:

[R]elative to a given performance, where the impression fostered by the performance is knowingly contradicted as a matter of course (*ibid.*, p. 69).

Indeed, Marilyn openly acknowledges that her approach is far from effective, both in terms of the frustration she may impose on others and in terms of her self-estimated three-week email backlog. With regard to the former, the top management team at Epsilon concurred with Marilyn's self-assessment in terms of lack of response on email. One of

the senior members of the executive team delicately describes his reaction to this lack of response:

[I]t's been a struggle for me [...] What I would say is, we're learning to adjust, I guess, and when I say 'adjust' what I counsel my people on is: We'll do the best we can—period (Interview 1061 19 March 2010).

In this quote, the executive acknowledges the issue as a 'struggle' to which he and his team are 'learning to adjust'. The message here from the senior executive is that the executive and his team must accept Marilyn's lack of email response and work around it as best they can.

With regard to Marilyn's self-assessment of her email backlog, when comparing this backlog at [Epsilon](#) to what was observed at [Eta](#), there are several orders of magnitude difference. In an interview, Sebastian stated that he tends to receive at least 100 messages per day (Interview 1019 10 October 2013). Three weeks at that rate would be a backlog of at least 1,500 messages. This disparity is a significant material difference in outcomes between these sites.

One of the other reasons for this difference appears to be that Marilyn's executive assistant (EA) did not take the same kind of interest in Marilyn's emails as Ruby did with Sebastian's. In my discussions with Marilyn, she asserted that her EA has access to her email and that the EA alerts Marilyn if something important comes in. However, the level of engagement with Marilyn's email seemed to stop here. There was no mention, for example, of responding on behalf of Marilyn and no talk of drafting of emails on Marilyn's behalf. In the case of [Epsilon](#), Marilyn's EA apparently engaged in none of these practices. These characteristics, coupled with Marilyn's view of how a CEO 'should' behave vis-à-vis a computational object thus contributed to a materially different set of circumstances than what was observed at [Eta](#).

Marilyn offered supplementary details of the logic behind her decision to focus more on people and less on computational objects. In the excerpt below, I had just asked her about how she likes to receive information from her subordinates:

INFORMANT: I like to be updated either by email or hallway conversations, you know, beginnings and endings of meetings in terms of so that I can track. My least favorite is 'Here's information, an element from here, here's more information,' and the reason why I find that to not work very well is because if I'm relying on my—kind of the emotional intelligence to figure out [a] different direction we can go then I'm missing a lot of information along the way as to smaller

nuances as to how things are unfolding to be able to kind of help direct or problem-solve when we—when they get stuck, which is usually when they come to me for information.

INTERVIEWER: So I'm kind of getting this image of like [Epsilon](#) is a body that you inhabit, that you have to make sure that you get around even though there are other leaders. It sounds like you're very tactile in a way. You have to be in front of people, you need to speak with them, you need to see what's going on in their eyes to get a sense of what's really happening in the environment. Do you feel like—I mean, how is that, in your mind, different than intuition? Because I think you talk about it in terms of emotional intelligence [crosstalk]—

INFORMANT: Yeah or intuition. I use those interchangeably, you know? Intuition's a great—I just sat in a meeting this morning and we were working on our [name of product line] business and some of that intuition of is somebody being conservative, you know, do reading body language in terms of how much have they really gotten done versus how much they're telling me they've gotten done, you know, how questioning, kind of, their process of how they came to the conclusions that they came to kind of test the logic and the reasoning of the conclusion that they made (Interview with 1005 26 March 2012).

Here, Marilyn expresses the importance for her of 'reliance' on 'emotional intelligence' or 'intuition' by being attendant to 'smaller nuances' that are implicit in face-to-face engagement. In the final paragraph of the excerpt, she provides an example of how a face-to-face context—a meeting—provides an arena for her to read the participant's 'body language' while simultaneously evaluating the 'logic and the reasoning' being presented to her. This way of being in the world is apparently central to Marilyn's identification with her role as CEO.

To compare this with how things are at [Eta](#), let's begin with a statement from its CEO and his perspective on *empathy* in his leadership practice:

So really, what you're talking about with empathy is understanding or connecting with what someone else is thinking. You know, what's—and it's not about mind-reading. It's about listening to people and hearing what they're saying and taking their body language and cues and whatever [...] when

you're collaborating very intensively, if you're jointly solving a problem, it's my contention that it's more important to understand how the other person is trying to solve a problem and to work with [rather] that than to simply be able to solve the problem themselves [...] You really need to come to a consensus and have a collaborative approach to problem solving. And that simply requires empathy. You've got to stop and listen. You've got to recognize what the other person is saying to you, to consider it carefully. I mean I'm sure you've met plenty of people who it feels as if you're talking to them, but really, they're talking to themselves (Interview 1008 February 25 2013).

And indeed, not only is this notion of empathy promoted and practised by the CEO within [Eta](#), but it was also, for example, recognised by Ruby in her relationship to Sebastian and [Eta](#) when she said in section 5.3.2 on page 148 that she felt that she was respected at [Eta](#). To be respected means to be seen as you would like to be seen and such a state is achieved by what [Eta](#)'s CEO describes above as 'stopping and listening', recognising what the other person is saying, and carefully considering it.

Moreover, at [Eta](#) it was common for meetings to be structured with a number of in-room participants along with a number of participants also present through Google Hangouts™, thus constructing a hybrid space where some members are physically present and some were not. An example of such meetings was the weekly director meeting conducted by Sebastian at [Eta](#), where all the directors of [Eta](#)'s various sites worldwide were present. It was common for four participants to be present in Sebastian's office with him with an equal number of participants on the Google Hangout™.

In these director meetings, Sebastian was often quite active on his computational object, however, this did not seem to lessen his ability to apply what Marilyn called 'emotional intelligence' and attention to 'nuance'; what the CEO of [Eta](#) called 'empathy' in his engagements with his reports. For example, I witnessed a meeting where a disgruntled employee came to speak with Sebastian about their concerns. I was impressed with the degree to which Sebastian attended to the person on an emotional level and also addressed the concerns practically.

Thus, the existence of Sebastian and his enactments of leadership practice, including both empathetic engagements as well as intensive engagement with computational objects, suggests that the style of leadership Marilyn guards so closely can also be achieved in an environment where engagements with computational objects are also undertaken by the senior executive without devaluing either face-to-face engagement or the C-level position.

5.4 Discussion and Summation

Is Leadership Located in a Leader? A central question this chapter has posed is whether it is a valid assumption to locate leadership within formal leaders. Empirically, what I have shown is that leadership arises through practice, and that not all such practices are enacted by formal leaders. I have shown, for example, that humans who do not hold formal leadership positions, as well as non-human computational objects, are constitutive in the enactment of leadership practices. This is evidenced in great depth through the case at [Eta](#) where we saw the significant roles that Ruby and various computational objects play in the enactment of such material-discursive practices as pair emailing and calendar management. Thus, I argue that while it may be a valid assumption to locate leadership within formal leaders, the enactment of leadership is not limited to this narrow purview. Rather, as Uhl-Bien and Ospina note, leadership is:

[A] relational (social) process. It is a distinct and pervasive social phenomenon that has important outcomes in society (both good and bad). Moreover, because it is a social process, it occurs in context. Therefore, to learn more about relational leadership, we need to consider process and context in the study of leadership ([2012a](#), p. 546).

To this extent, the present study has immersed itself in process and context through its empirical focus on practice as it unfolds over space and time. As a result, the evidence presented in this chapter, in terms of the doings and sayings of the parties involved, provides a rich account of how the practice of leadership is accomplished at [Eta](#) vis-à-vis email. At [Eta](#) in particular, these data reveal a form of real-time computational engagement, where the ‘doing’ (Nicolini, Gherardi et al. [2003](#), p. 21) of leadership activities is distributively enacted through an assemblage of sociotechnical humans and computational objects (Latour [1999](#), p. 159).

Thus, the analysis presented here has highlighted the concept that the enactments of leadership are not accomplished solely by an individual holding a particular position, but rather, by a human and non-human network of actants (Latour [1992](#), p. 256). And while the present chapter is limited to two cases, I suggest that given the ubiquity of computational objects within globalised corporate organisational environments (Lyytinen and Yoo [2002](#); Yoo [2010](#)), one would be hard-pressed *not* to find formal leaders within such environments who, in one fashion or another, lead *through* their computational objects, as the present data have shown. In this sense, the study addresses a critical gap in the leadership literature where computational objects are excluded from the action (Lowe and Gardner [2001](#), p. 501). What the present chapter illustrates is that computational objects

are, in a very real sense, focal points (Guimbretière 2002) for the practice of leadership, evidenced, for example, in the practice of pair programming as enacted by Sebastian, Ruby, and their computational objects. For this reason, I suggest that leadership, among many other qualities, flows through these objects.

Technological ‘Choices’ and the Technological Unconscious Further, the data suggest that the choices a formal leader makes about the ways they engage with computational objects is a structuring factor in leadership style. To illustrate this point, I contrasted two very different approaches formal leaders take with their email, leading not only to different outcomes or *results*, as depicted in figure 2.4 on page 32. In the first case, Sebastian’s approach at *Eta* coalesces both a technological and human stance towards engagement, where Marilyn at *Epsilon* asserts to favour the human while her *backstage* (Goffman 1956, p. 69) practice with computational objects nevertheless reveals that she is caught up in the grip of the computational object during her isolated time at home and on airplanes. These observed variances in practice are also consistent with the findings in Mazmanian’s study that explores how similarly polarised styles of engagement with mobile devices emerge (2013).

Crucially, these different approaches to computational engagement also lead to very different kinds of human engagement, where in Sebastian’s case at *Eta* there was evidence of a more simultaneous real-time engagement with other humans and computational objects that includes instant messaging (IM) and other modes of information and communication technology (ICT). I would describe what was observed at *Eta* as displaying a significantly greater and more fluid style of engagement between people and computational objects than what was observed at *Epsilon*.¹⁴ This is not to argue that one approach is better than another but rather to note that there are qualitative distinctions that correspond to different styles of human-computer interaction, potentially leading to alternative entanglements. The subtle detail here that sometimes escapes conscious attention is that human relations are often constituted *through* computational objects, whether these are within email, IM, or audiovisual communication like Skype™ or Google Hangouts™.

In this vein, I would like to suggest that formal leaders, as a function of their symbolic *position*, as depicted in figure 2.4 on page 32, are likely have some impact on the way practices, such as the mode of engagement with computational objects, are taken up by their subordinates (Jackson and Parry 2011, p. 43). Thus, it is possible that formal leaders who engage openly and fluidly with both human and computational objects may well engender similar behaviour on the part of their subordinates (Elenkov and Manev 2005,

¹⁴These observations at *Epsilon* were based on site visits that preceded the present research, as described in section 3.3.2.

p. 385).

However, as previously reported in section 3.1.3.3 on page 95, where the narratives from early sensitising interviews revealed distinctive orientations to computational technology between technology and non-technology companies, it may also be significant that *Eta* is a technology company while *Epsilon* is a clothing manufacturer. While both use information technology extensively, it is also the case, based on the focus of the business, that the people who work at *Eta* by and large have a much more explicit orientation towards computational objects than those at *Epsilon*. Perhaps these differences also account for, to some degree, for why formal leaders in different sites make different kinds of decisions regarding their relations with computational objects. Thus, it remains an open question, the degree to which leader behaviours shape organisational culture or vice-versa (Heifetz et al. 2009b; Kellerman 2012, pp. 42-43). If, however, one were to take a Baradian perspective that favours *intra-action* (Barad 2007, p. 237), both would be acknowledged to be correct and co-constitutive.

Amidst these complexities where leaders may be shaped by and simultaneously exert influence on the environment, I want to clarify that when I refer to ‘choices’ formal leaders make about computational engagement, I am not suggesting that such deliberations are made under rational choice theory (March 1991, p. 97). Rather, I refer to a more subtle and passive view of choice, one instead influenced by the ‘technological unconscious’ (cf. Clough 2000, p. 2; Hayles 2006, pp. 138-139; Thrift 2004a, p. 41, 2004b, p. 187).

Hayles describes the technological unconscious as being marked by:

[T]he everyday habits initiated, regulated, and disciplined by multiple strata of technological devices and inventions, ranging from an artifact as ordinary as a wristwatch to the extensive and pervasive effects of the World Wide Web [...can be understood by] thinking of cognition as something that, far from being limited to the neo-cortex, occurs throughout the body and stretches beyond body boundaries into the environment (2006, pp. 138-139).

Thus, critical to this concept of the technological unconscious is the lack of awareness an individual may encounter regarding the phenomenological experience of living (and thinking) amongst artefacts. As Clough puts it, this is observable as a:

[R]esistance to recognize the technical substrates of unconscious memory [...and the] refusal of an intimacy between the body and the machine, nature and technology, the virtual and the real, the living and the inert (2000, p. 17).

Thus, I argue that in many of the cases where ‘choices’ about computational objects are being made by formal leaders, there is a tendency, as evidenced in the case of

Marilyn at [Epsilon](#) and her rationale for not wanting to be seen at work sitting behind a computer screen, for this rationale to completely overlook the level to which daily life is ‘initiated, regulated, and disciplined by multiple strata of technological devices’ (Hayles [2006](#), p. 138). In other words, in consciously choosing her rationale, there appears to be a lack of awareness of its effects, for despite her choice not to engage with technologies at work, she is doing so *backstage* (Goffman [1956](#), p. 69), which means that she is bringing work into her personal life. There is a paradox here in that she consciously chooses to distance herself from computational objects at the workplace, but ends up having to work with them anyway. Through this course of action, I suggest that she is not fully considering the role of technology in her worklife and the effects she is trying to produce through it. Instead, her rationale effects a ‘choice’ that privileges human-to-human interaction and thereby places technology in a role where it receives less attention and thought in terms of how it is mobilised in practice. This raises the question of what exactly she is trying to achieve with it. In the case of Marilyn, I suggest that this question, as a function of her logic, remains unaddressed.

In this sense, Marilyn’s rationale can be viewed as an unconscious form of reasoning in that it ignores the technological ‘reality’. Moreover, and consistent with Marilyn’s position, in almost every observational case I undertook with a formal leader, similar gaps in formal reasoning were evidenced. For example, when I asked a formal leader at [Eta](#) why he did something with a computational object in the way that he did it (for example, conducting an interview without initiating video), the answer, surprisingly, was ‘I never thought about it before’ (field diary 13 Nov 2012). Thus, I argue, there is a degree to which myriad ‘choices’ regarding computational objects are not being fully considered.

This is a paradox, for while the empirical evidence presented in this chapter shows that the computational object clearly plays a significant role in constituting human relationships in these environments, it does not seem, among the formal leaders I followed, to be conspicuously considered in practice, whether they are technologists or not. Rather, its use tends to fall into particular habits that, in many cases have, not been exposed to the same levels of formal analysis that the same leader might apply to a finance or human resources decision. It is relegated, in the spirit of Clough’s term, to the ‘technological unconscious’ ([2000](#), p. 2), both cognitively and in terms of the actual leadership practices being enacted.

In contrast, I refer the reader back to section [5.3.1.3](#) on page [148](#), where I argued based on the constraints that the Google Calendar™ system imposes, Ruby developed a strategy of artificially filling Sebastian’s calendar with dummy appointments. This, perhaps, epitomises the *opposite* of making decisions through a ‘technological unconscious’ (*ibid.*), for in this case, Ruby actively *partnered* with the system to align with and exploit

its constraints to her advantage in pursuit of her goal to achieve specific *results* as depicted in figure 2.4 on page 32.

A recommendation that follows from this finding for leadership development programmes is to include the idea of the technological unconscious as a sensitising concept in formal leadership training where leaders-in-training can be made aware of the concept and some of the ramifications of their choices, such as the distances various technological means of communication introduce (cf. Bligh and Riggio 2012a).

The Question of Technology But despite Ruby's technological consciousness with regard to Google Calendar™, or any separate efforts that might be made to inject increased consciousness with respect to technology in leadership development, technological unconsciousness, according to Hayles, cannot ever be completely overcome. This because:

[T]he cognitive systems entraining human behavior become even more pervasive, flexible, and powerful in their effects on human conscious and non-conscious cognition [...thereby resulting in] human behavior is increasingly integrated with the technological nonconscious through somatic responses, haptic feedback, gestural interactions, and a wide variety of other cognitive activities that are habitual and repetitive and that therefore fall below the threshold of conscious awareness (Hayles 2006, p. 140).

This view echoes, and in a sense, specifies Heidegger's assertion that:

[T]echnology will never allow itself to be mastered, either positively or negatively by a human doing founded merely on itself. Technology, whose essence is Being itself, will never allow itself to be overcome by men (Heidegger 1977, p. 38).

For Heidegger associates technology *itself* as one of the ways Being conceals itself. His solution to this dilemma, according to Coyne, is to learn to cooperate with this form of Being, which he describes as:

[A] "letting be" or "releasement". Heidegger uses the archaic German word *Gelaßenheit*, which [in this sense means] letting Being reveal itself. The antidote to the enframing of technology is not revolution but adopting a new attitude (Coyne 1995, p. 85).

This *Gelaßenheit*, according to Heidegger, is a game of balancing opposites. He suggests that:

Still we can act otherwise. We can use technical devices, and yet with proper use also keep ourselves so free of them, that we may let go of them any time. We can use technical devices as they ought to be used, and also let them alone as something which does not affect our inner and real core. We can affirm the unavoidable use of technical devices, and: also deny them the right to dominate us, and so to warp, confuse, and lay waste our nature.

But will not saying both yes and no this way to technical devices make our relation to technology ambivalent and insecure? On the contrary! Our relation to technology will become wonderfully simple and relaxed. We let technical devices enter our daily life, and at the same time leave them outside, that is, let them alone, as things which are nothing absolute but remain dependent upon something higher. I would call this comportment toward technology which expresses ‘yes’ and at the same time ‘no,’ by an old word, *releasement toward things?* (1966, p. 54)

Under this balanced view of Heidegger’s *Gelassenheit*, I suggest that Ruby’s engagement with the Google Calendar™ represents an enactment of this *Gelassenheit*. Ruby says ‘yes’ to the technology by using it to manage Sebastian’s calendar, but she also says ‘no’ to it by using her cognitive skills to understand what its constraints are, what the other people using the system see based on her actions, and what her goals are to come up with an interactional approach that allows her to reach her desired goals.

Implications for the study of Leadership To some extent, all of the arguments I make here in this chapter are an inevitable conclusions if one takes seriously the words of Foucault and Latour. Foucault, for example, makes it clear that the ‘great state apparatuses’ of the seventeenth and eighteenth centuries are ‘technological’ in nature (Foucault 1984, p. 61). And in a similar vein, Latour notes that the:

[Q]uestion known as ‘the division of labor’ may in no sense be differentiated from the question of what is technical (Latour 1994, p. 45).

Thus, for both Foucault and Latour, there is never any question but to include techniques and technologies in the same analytical category—and to ensure their inclusion in the analysis of the ‘social’. Contrary to this position, the general propensity of leadership scholarship is to omit technology altogether (Bass and Stogdill 1990b, p. xiii; Kahai 2012, p. 100; Lowe and Gardner 2001, p. 501). More broadly however, Zammuto et al. note this is a symptom attributable more generally to organisational scholarship (Zammuto et al. 2007, p. 749). Indeed, Latour suggests, based on the historical trajectory of sociology, that

the omission of artefacts reaches back to the work of Durkheim (1994, p. 45). From this perspective then, there is systematic and historical tendency to ignore the role of techniques that become embedded as technological objects in organisational life. Thus, one of the foundational implications of this research for the study of leadership is to highlight the central role these objects play in the enactment of leadership.

One might also argue that such a bias to remove technology from the equation is, to some degree, engendered from a dominant view of individual agency based on individualism and liberalism where:

‘[L]iberalism’, as Friedman called it, has penetrated economics, law, sociology, social psychology and most other core disciplines, yielding theories such as agency theory, transaction cost economics, game theory, social network analysis, theories of social dilemmas, and so on, that we now routinely draw on both, radical individualism and Friedman’s liberalism, to frame our research and to guide our teaching (Ghoshal 2005, p. 84).

Within this volunteerist frame, technologies are generally not viewed as autonomous agents, although there is no shortage of scholarly support for such a position.¹⁵ Indeed my position here is decidedly posthuman in that the empirical evidence I have presented shows that it is not only the human that acts or has agency. In the next chapter, I explore this so-called agency of non-humans even more closely, through an exploration of technological breakdowns on leadership practice.

¹⁵See footnotes 22, 23, and especially 24 on page 54.

Chapter 6

Breakdowns

Who indeed has not felt the force of his own personality before a sensitive machine? (Mailer [1970](#), pp. 167-168)

6.1 Introduction

WHEN COMPUTATIONAL TECHNOLOGY OPERATES AS EXPECTED, it often seems to fade into the background. But what about when it does not? Whereas the previous two empirical chapters looked at specific material-discursive practices—pair programming and emailing—in order to reveal how leadership is constituted in their enactment, this chapter instead explores the ways that breakdowns—specifically those materially embodied through computational objects—impact leadership practices. As with the previous chapters, the data for this case was selected based on Flyvberg’s critical case approach ([2011](#), p. 307), described in detail in section [3.1.3.4](#) on page [96](#). Moreover, heeding the call of Sandberg and Tsoukas ([2011](#)), this chapter employs *breakdowns* as a site for understanding the relationship between leadership practice and computational objects from a novel perspective, one that can be understood as an inversion of practice.

According to Sandberg and Tsoukas, it is through these:

[B]reakdowns that the relational whole of sociomaterial practice is momentarily brought into view (*ibid.*, p. 344).

Here they suggest that when breakdowns occur, it is possible to see practice in a different light; for in the moment of a breakdown, the practice ceases to function, while the sociomaterial assemblage that was previously employed and obscured by the active, functional practice comes into sharp relief. The underlying assemblage is, then, for the duration of the breakdown, made visible. Thus, in this chapter, I focus on empirics involving breakdowns in order to reveal this ‘relational whole’ to which Sandberg and Tsoukas refer.

Following their call further suggests that I mobilise a number of associated theoretical concepts in tandem, including Heidegger's views on tools, technology, and breakdowns (1927 / 1996, 1977). Further, this approach implicates Sandberg and Tsoukas' *practical rationality*. Practical rationality involves the development of theory that 'explore[s] how organizational practices are constituted and enacted by actors, [and] capture[s] essential aspects of the logic of practice' (2011, p. 339). In addition to the empirical material itself, I engage with these theoretical concepts as a means to more fully explicate the relationship between leadership practices and computational objects and, in particular, the ways in which leadership practices are enacted through, and their dependency on, computational objects.

6.2 Breaking Down Breakdowns

Within various literatures, breakdowns have been studied extensively. Many of these emphasise the philosophical ramifications of breakdowns. Verbeek (2005), for example, has observed in his analysis of Heidegger's view on technology that:

The trustworthy world that developed around the computer—the open books, the keyboard, the screen, the cup of coffee; in short, the entire mutually referring network that Heidegger calls a world—is abruptly destroyed. The computer changes over from being one of the handy or ready-to-hand objects that shape this world to what Heidegger calls something *vorhanden*: 'objectively present' in the newer translation, or 'present-at-hand' in the older. Its transparency is transformed into opacity. The computer no longer can be conveniently utilized in the practice of writing, but abruptly demands interaction with itself. The relation with the world around the computer that took place 'through' it is disturbed. Only when it starts up again and everything works without a hitch is the world that was destroyed again restored (*ibid.*, pp. 79-80).

This space of the breakdown, according to Verbeek, marks a qualitative shift in the relationship between a human and a computational object, one that moves away from the former's intended practice to the attendance of the latter's 'needs'. These 'needs' are not like human or animal needs, nonetheless, because without attending to them or finding some way to work around them, the practice that was formerly in process cannot be reconstituted.

Yanow and Tsoukas (2009) also leverage Heidegger in their reflections of the practice perspective of Donald Schön to reframe his ideas in a phenomenological perspective.

They explore the concept of breakdown explicitly as a means to explain competency in practice through *reflection-in-action* which they distinguish from:

[S]urprise and awareness [...] articulating more clearly the way improvisational responses emerge in the midst of action (2009, p. 1357).

Sandberg and Tsoukas also invoke Heidegger in their conception of breakdowns by employing Heidegger's categorisation of *temporary* and *total breakdowns*. According to Sandberg and Tsoukas, temporary breakdowns involve a movement from a previous intention and towards 'paying deliberate attention to what we do in order to continue' (2011, p. 344). In contrast, a total breakdown involves an acknowledgement on the part of the human that the intention cannot continue, resulting in a state that Dreyfus refers to as 'theoretical reflection' (1991, p. 80). This is a term he uses to denote a mode of being in the world 'detached from the everyday practical context' (*ibid.*, p. 83) when 'work is permanently interrupted, [and] we can either stare helplessly at the remaining objects or take a new detached theoretical stance towards things and try to explain their underlying causal properties' (*ibid.*, p. 79).

Within their work, Sandberg and Tsoukas also argue for an alternative framework to the representationalism of scientific rationality that brings the research closer to 'the logic of practice' (2011, p. 353). Their alternative, *practical rationality*, is an approach that enables the development of open-ended theories 'in the sense that they are open to further specification in particular cases' (*ibid.*) that:

[A]re seen as indicators that guide the search for better understanding, encouraging researchers to look for family resemblances—namely, for the similarities and differences among the empirical phenomena indicated by a concept (such as, for example, routine-in-action, strategy-as-practice, sensemaking) (*ibid.*).

In this view, Sandberg and Tsoukas argue for a methodologically comparative approach, not unlike Ragin (1989). Unlike Ragin, however, theirs is ontologically grounded in the work of Heidegger (1927 / 1996) and his core ideas of tool-being and breakdown. Indeed, their alternative to the hypothetico-deductive tradition of scientific rationality is argued explicitly through the very notion of breakdowns.

Graham and Thrift also explore repair and maintenance as an ongoing response to continual breakdowns. For example, within the modern-day city, they call our attention to:

[S]irens denoting accidents, to the noises of pneumatic drills denoting the constant upkeep of the roads, through the echoing clanks and hisses of the

tyre and clutch replacement workshop, denoting the constant work needed just to keep cars going (2007, p. 3).

Mobilising a materialist perspective and invoking Heidegger's *zuhandenheit* (1927 / 1996, pp. 64-67), they argue:

[T]hat a major research challenge in the social sciences currently is to re-imagine economies and places in ways which, to adopt Susan Leigh-Star's term, manage to 'surface the invisible work' (1999, p. 385) of maintenance and repair that continuously surrounds infrastructural connection, movement and flow (2007, p. 17).

Thus for Graham and Thrift, a processual cycle of ongoing breakdowns triggers ongoing repair and maintenance and is a profoundly political issue; one where options abound and choices have consequences. Their concern is how the space of ongoing breakdown gives rise to choices and that the choices and their outcomes have wide-reaching effects, including worker wages, living conditions, deskilling, and concealment of expenditure related to repair (*ibid.*, p. 18).

Suchman also explores breakdowns in her landmark study of user interaction with copying machines, drawing on both the work of Heidegger and Dreyfus (2007, pp. 73-74). Here, Suchman makes a distinction between the kinds of temporary breakdowns already described and those that arise out of a user's lack of familiarity with the equipment. Indeed it is explicitly as a result of such breakdowns that Suchman argues for *situated action*, which:

[I]s not made explicit by rules and procedures. Rather, when situated action becomes in some way problematic rules and procedures are explicated for purposes of deliberation and the action, which is otherwise neither rule based nor procedural, is then made accountable to them (*ibid.*, p. 74).

In other words, when breakdowns occur, rules and procedures, which are often the reference points for various practices, no longer function and people must account for their own actions in a different fashion than through pre-existing rules and procedures. Such action must therefore be *situated* and not predetermined.¹

Note however, that Suchman's view on breakdowns not only applies to interactions between humans and non-humans, but also between humans in terms of breakdowns in communicative acts where:

¹See, however, Ciborra's critique of this term and his argument that Heidegger's term, *befindlichkeit*, has been mistranslated into the term *situated*, and omits an essential affective component in its general understanding and use within the literature (2006).

[T]he coherence of the interaction over some indefinite number of past turns may be called into question, and the source of the trouble may be difficult or impossible to reconstruct. In contrast to the routine problems and remedies that characterize local repair in conversation, such a situation may come close to communicative failure; that is, it may require abandoning the current line of talk or beginning anew (2007, p. 101).

It is interesting to note that Suchman does not refer to such issues as ‘breakdowns’ but instead uses words like ‘problems’ and ‘failure’. I suggest, however, that while Suchman never explicitly states this, breakdowns in communication between people offer yet another site of the same pattern of breakdown where subject-object relations are transformed. A difference is that in human communication, the object-in-question is intelligibility, which is not an externally materialised, physical object.² Suchman acknowledges the existence of such a non-physical object when she asserts that:

Human interaction succeeds to the extent that it does, however, due not simply to the abilities of any one participant to construct meaningfulness but also to the possibility of mutually constituting intelligibility, in and through the interaction. This includes, crucially, the detection and repair of mis- (or different) understandings (2007, p. 12).

This, as with the positions of Graham and Thrift (2007), Sandberg and Tsoukas (2011), and Yanow and Tsoukas (2009) asserts a processual perspective where breakdowns are considered an inherent part of the construction of, in this case, intelligibility. When, through breakdown, access to intelligibility is obstructed, human communicative practices employ the breakdown as a means to repair and maintain, just as Graham and Thrift’s pneumatic drills maintain the roads.

Elsewhere, however, Suchman specifically acknowledges the role of technology and its associated breakdowns as located amidst an even more basic phenomenon—the very constitution of subjects and objects. In this view, computational technology sits:

[P]rovocatively on the boundary of subjects and objects, threatening its breakdown at the same time that it reiterates its founding identities and differences (2011, p. 133).

Thus, human interactions with computational technology, for Suchman, offer a Janus-faced set of relations. On the one hand, these relations always hold the possibility

²For perspectives on such non-physical objects limited to the technical sphere, see Faulkner and Runde 2010; Kallinikos, Aaltonen et al. 2013.

for breakdown, while on the other, idealisations about them are discursively employed ‘within both technical and popular imaginaries’ (2011, p. 133) as a means to normatively shape perceptions of such objects, and thus, our own identities in relation to them.

In summary, all of these positions explore breakdowns, not only from a practical perspective through their outcomes and consequences, but through a consistent emphasis on their philosophical ramifications.

Meanwhile, a still broader stream of literature explores specific and famous breakdowns as a means to understand them and, in many cases, to either promote learning or at least suggest opportunities for learning that arise out of breakdowns (Beck and Plowman 2009; Bostrom and Heinen 1977; Christianson et al. 2009; Weick 2008). Such studies are often couched in terms of a tension between human and system error that leads to breakdown (Beynon-Davies 1999; Yeo 2002). Such studies tend to frame breakdowns as events that contradict expected outcomes and, therefore, have the power to surprise and shock (Lyytinen 1988; Weick and Roberts 1993).

Specifically, with respect to relationships with technology, there exist studies on systems that inadvertently kill people by administering too much radiation (Leveson and Turner 1993), space shuttle disasters (Starbuck and Milliken 1988), buggy missile defence software (Halpern 2005), failed transit systems (Latour 1996a), military drones employed as thanatological devices (Sharkey and Suchman 2013), and a range of other high-risk technologies (Perrow 1984). However, it is not necessary to explore such Frankensteinian scenarios (Winner 1997); one can just as easily argue that *any* study that explores how people work with technology in any depth must also address the everyday mundane issue of breakdown (Nicolini and Roe 2014, p. 70; Nicolini, Mengis et al. 2011, p. 13; Orr 1996, p. 3; Star 1999, p. 382).

Thus, a wide range of studies have explored breakdowns as a means to make sense of practice. Such studies, as I have shown, highlight the philosophical ramifications of breakdowns; for many of these, the work of Heidegger (1927 / 1996, 1977) is a perennial resource. I have also shown that studies that explore breakdowns can be very specific, looking at particular incidents and linking them to human learning and/or relationships to technology. This chapter follows this established tradition but, in particular, also responds to Sandberg and Tsoukas’s call for the development of open-ended theory through practical rationality (2011, p. 353).

6.3 Findings: The Indeterminacy of Breakdowns

The data presented in this chapter was collected from two different sites at the company [Eta](#). The informants presented in the episodes include [Walt](#) and [Ari](#),³ both of whom work at different locations within [Eta](#) and both of whom, in my presence, experienced breakdowns with their computational objects. However, they each responded to these breakdowns quite differently. The episodes, by describing these different responses, demonstrate a spectrum of responses to (computational) interruption ranging from ‘freezing up’, at one end of this spectrum, to improvisation, at the other.

These two episodes are exemplars of a common phenomenon observed throughout the study, namely the mode in which computational objects, in opposition to their ideologically accepted purpose as tools for efficiency (McCarthy 1966, p. 65; Winograd and Flores 1986, p. 175), serve as centres of interruption or delay. This was especially and repeatedly observed during many Skype™ calls, FaceTime™ calls, Google Hangouts™, and other audiovisual information and communication technology (ICT) platforms. For example, on many occasions, commencing or continuing a meeting involving these platforms was frequently delayed due to someone’s audio not working properly. Adjustments of cameras, sound preferences, and other necessary material engagements with the computational object to address these breakdowns were accepted as part of everyday experience for those I observed, often with the participants making jokes about the problems they commonly experience with these tools.⁴ In this chapter, I explore two cases in order to interrogate the different responses to such interruptions, that is, interrogating the human choices made in response to them. I turn now to the first episode, where we re-join Walt in a remote pair programming environment.

6.3.1 Episode One: ‘Freezing Up’ with Walt

As an [Eta](#) employee often paired with clients, Walt is expected to embody the idealisation of agile software development practices (Poppendieck and Poppendieck 2003) and appears to take great pride in this. This is an implicit rather than formal leadership role, where Walt is presented to clients as an expert whose knowledge and experience enable him to guide (and thus lead) them in learning and understanding agile methodologies, whilst

³For more information on [Eta](#), see section 3.3.1. For further information on [Walt](#) and [Ari](#), see sections 3.3.1.3 and 3.3.1.4, respectively.

⁴In Heidegger’s terminology, this class of breakdown would be referred to as *Malfunction* (Dreyfus 1991, pp. 71-72) and is considered least impactful with respect to the way it alters the relationship between subject and object. In contrast, the more extreme *temporary breakdown* (*ibid.*, pp. 72-79) and *total breakdown* (*ibid.*, pp. 79-83) would more accurately describe the kinds of breakdowns explored in the episodes, albeit I will argue that the extent of the breakdown hinges on the human decisions made about it and the subsequent actions taken.

simultaneously addressing real-world programming challenges. As presented in chapter 4 on page 110, one of the central agile practices at Eta is pair programming, where two programmers sit together and work on the same screen, programming lines of code as an ensemble through ongoing conversation.

However, most of Walt's engagements with clients and other Eta employees is virtual, and Walt explains to me that he has put a great deal of effort into organising an array of computational objects to enable effective remote pair programming. These arrangements are discussed in detail in section 4.3.2.⁵ It is clear from the specificity of these arrangements that Walt has given considerable thought to how his workspace might be arranged with particular attention to the enablement of pair programming practice remotely.

During my observations with Walt he explained that a recurrent stand-up meeting (Augustine et al. 2005, p. 88) is generally set for 10:00 a.m. each day.⁶ As this is a recurring event, Walt has created a persistent Google Hangout™ that appears as a link in his a calendar entry on his Macintosh™. However, due to platform differences, the link to the persistent hangout is not visible on the web-rendered view of the calendar on an iPad™. Walt remarks that he finds this frustrating because he wants to initiate the hangout from the iPad™. Further, going to the Google Plus™ application on the iPad™ does not allow access to the named hangout either, so he copies the link from the Macintosh™, mails it to himself, and then retrieves the link through an email client on the iPad™. He remarks that these 'kinds of hacks are par for the course' (field diary 26 March 2013). We ultimately end up connecting via FaceTime™ instead of a Google Hangout™.

When we do connect at 9:53 a.m. to a colleague at the other location, we discover that he is struggling with updating a shared iPad™ whose applications have been downloaded under a number of Eta user accounts. As he is a client and not an Eta employee, he does not have the account password and so is unable to initiate the update.

At this moment, the power in Walt's home goes out. The FaceTime™ link is severed and the network also seems to be down. However, Walt has an uninterruptible power supply (UPS), which is currently powering his main computer. It remains on despite all the lights now being off. He proceeds to shut the machine down cleanly, expressing his frustration to me with the fact that there are things beyond his control. Walt then tries to send a message to his colleague via Google Plus™ on his iPhone™ but is blocked by two-stage verification (Google 2013a), as he has not installed the authentication application on his phone that generates the second-level passkey. I ask Walt if he has the phone

⁵In particular, I call the reader's attention to figure 4.1 and table 4.2 on page 116.

⁶Despite the name, Walt did not stand during any of these meetings. This is one of the ways in which virtuality distorts traditional meanings. In contrast, I did observe other stand-up meetings at Eta. At these meetings, all participants were physically present and they all did stand during the meeting.

number at the other location and he says he does not. Suddenly, Haraway's 'congealed decontextualization' (1997, p. 8) has completely dissolved. The general role of technology that Borgmann asserts as being invisible and unchallenged (1987, p. 220) has suddenly become centrally visible and extremely challenging.

Growing more agitated, Walt switches to Google Chat™ on his iPhone™ and suggests a Skype™ voice call for the stand-up. It is not clear that his message is received and Walt appears to struggle as he thinks about what he wants to do in the face of this interruption while simultaneously typing text messages on a tiny phone keyboard.

We discuss strategies of what to do if the power does not come back on. There is a sense of a sort of thrashing that one experiences with a computer when memory resources are overloaded; clock cycles are taken up with very little visible activity. Like a deer in the headlights, Walt seems to have frozen mid-stream, not able to complete any single task without significant effort, perhaps called by the circumstances to make a decision without the support of computational objects and, at the same time, bound to them. After some minutes that pass like this, we agree he will check the power company's Twitter feed and I will report the outage on-line through our handheld computational objects and their associated cellular networks.

In navigating to the utility's web site, I find that the power outage is known to the power company and their estimated time for restoring the power is more than two hours, away, 12:15 p.m. This is not good news for Walt, who is already visibly upset by this disruption and further troubled by this new information. We discuss the possibility of going up the street to an Internet café and agree that this will be the best course of action. Walt begins typing a message to this effect to his remote colleague and then at 10:08 a.m. the power comes back on. Breathing a sigh of relief, Walt restarts his computer.

There is a sense, with the power having just gone out and all of the scrambling and resistance with technology that was experienced, that Walt has been under a sort of technological assault. Here, the computational objects, in a Latourian (1999) sense, has rebelled and refused to be enrolled (*ibid.*, p. 185) in the desired practice.

At 10:11 a.m., we are back on FaceTime™ with his colleague. While it has been less than 10 minutes since the power went off, this event has brought us to a palpable state of disruption. Walt is visibly agitated and tense. He relates to his remote colleague a previous situation where he had to work at an Internet café under a similar circumstance. He describes having a headset on, lots of cables connected to his computer, and typically arranged terminal windows with lots of code on the screen. He says he remembers that in sitting at the bar near where people add their milk and sugars people looked at him strangely. He realised that he looked like a typical hacker and was therefore being viewed as such. Walt and his remote colleague laugh about this, and I find myself thinking about

how this way of working reminds me of tribes of nomads, who have no real home, but must constantly move to find food. Except in this case, the target is internet connectivity.

At 10:14 a.m., in preparation for the stand-up meeting, Walt brings up the project work item tracking system (WITS) on his desktop machine. Others gather (and stand) remotely, signs that the stand-up will begin momentarily. Since yet another colleague is also working remotely, it is realised that the FaceTime™ link cannot be used for the stand-up as it only allows calls between two devices, so Walt tries to call both locations on Skype™. Walt is now on two cameras since calls are open on both Skype™ and FaceTime™ simultaneously.

The stand-up proceeds quickly and then Walt moves on to the work of pair programming with his client pair, but it is more than an hour before the heightened sense of agitation coming from Walt begins to dissipate.

6.3.2 Episode Two: Improvisation with Ari

Ari is scheduled to have a meeting with Maureen, Director of Marketing at the HQ office of Eta, via a Google Hangout™. Ari has initiated the hangout and there is some delay in the initial connection, so Ari clicks again on the ‘Connect’ button, causing two hangout windows to open, thereby creating a conflict he must resolve before the conversation can proceed. Once this has occurred, and the two are in conversation, their first task is to briefly discuss the problems with Google Hangouts™, where sentiments range from a general sense of never quite knowing if it is going to work properly to an appreciation of the way it works.

Turning to Eta business, Maureen notes that there has been a demand for materials to show customers. This includes overall sales and marketing materials as well as case studies. Maureen has prepared a grid showing the vertical markets where source materials for case studies exist within Eta. The grid shows some areas where no source material exists, represented by blanks in the grid. Maureen asserts that her focus right now is to explore how to direct their efforts to fill these gaps. She says that she is just starting to get a pipeline of enterprise case studies prepared. Maureen asks Ari if he has thought about the markets he wants to target. He responds without delay that he has selected three markets—and names them.

Attention then turns to reviewing a slide deck. Ari is not able to open this slide deck on the Macintosh™ operating system, apparently not having the correct software, so opens it by launching a virtual machine running Windows™. I note that he is on a MacBook Air™ with eight gigabytes (GB) of memory. Once the slide deck is open, the system crashes, suddenly disconnecting the call and forcing Ari to reboot. During this time, he uses his iPhone™ to re-establish and continue the call.

The interruption to the call is handled as a matter of course. Voice communication is re-established through the mobile phone (which is very quick, less than 30 seconds). After the machine reboots, Ari restarts the virtual machine, brings up the slides, and proceeds where he left off. Here, options for communication using different computational objects have been employed in quick succession. The disruption, in this case, was hardly noticeable.

6.4 Analysis: When is a Breakdown?

What are we to make of these two events? Why do two experienced technical leaders respond so differently to interruptions associated with the use of electronic and networked computational objects? Why are the outcomes different? To begin to answer these questions, let us first look at what happened *before* any breakdown.

In both cases, we see evidence of what Heidegger would refer to as *malfunction* (Dreyfus 1991, pp. 71-72) that *precedes* any actual breakdown. In Walt's case, this is evidenced by the issues he had with accessing the persistent link to the Google Hangout™ on his iPad™ and the various material enactments he must undertake to 'hack' the link to himself so that it is accessible from the iPad™. As a result, FaceTime™, rather than Google Hangouts™ is used and then, as a result of another remote party attending the stand-up, a combination of Skype™ and FaceTime™ is used. Also, within Walt's episode, his colleague Robert is blocked from updating the iPad™ since he does not have the *Eta* password. For Ari, a malfunction occurs when at the beginning of the Google Hangout™ with Maureen when he inadvertently clicks the 'Connect' button twice, thus opening two hangout windows and causing a conflict so that one of the windows has to be closed before the conversation with Maureen can proceed. In both of these cases, these 'breakdowns' are nominal in that they did not significantly alter the relationship between subject and object. The object in these cases, the computational object, continued to be treated by the human as a tool. The path both Walt and Ari took here was improvisational (Orlikowski 1996, cf. Orr 1996, p. 1; Vera and Crossan 2005; Yanow and Tsoukas 2009, p. 1357; Weick 2002); they both figured out ways to work around the limitations they encountered without breaking the frame of the established subject-object relationship between human and computational object.

However, when, in Walt's case, the power went out and, in Ari's case, the computer crashed, these breakdowns did alter the subject-object relationship between human and computational object in distinct ways. In Walt's case, his call was disconnected and he went through a period of sensemaking (Weick 1995) as he determined that the power had gone off from the evidence around him, while in Ari's case, the computer screen went

grey—an indication of a system failure. In both cases, conversations enabled through computational objects were terminated mid-stream, dramatically changing the working context. The question then becomes ‘What kind of breakdowns were these?’ Were they *temporary breakdowns* (Dreyfus 1991, pp. 72-79) or *total breakdowns* (*ibid.*, pp. 79-83)? I suggest here that the answer, to an important degree, depends on the response of the person to the computational object enacting the breakdown, which can be likened to a form of leadership where the individual either leads themselves (and others) towards a solution, thus enacting a temporary breakdown or remains mired in the breakdown, enacting a total breakdown.

In Walt’s case, the sensemaking (Weick 1995) process continued for some time into the breakdown where he tried to shift to other computational objects to re-establish communication but encountered further computational barriers, for example, in the form of the two-step verification (Google 2013a) that he was unable to cross. This was due to the fact he had not configured his computational object to provide the second-level authentication key. Through these kinds of encounters, Walt enacted a state where he was effectively immobilised through the selection of actions that did not adequately resolve the breakdown. This immobilisation is the ‘freezing up’ I referred to in the title of the episode and could also be referred to as a ‘deer in the headlights’. Yet, the possibility of an action Walt could have taken to resolve the breakdown remained. For example, he could have contacted the main office and asked them for the phone number of the remote site in order to re-establish communications, however, this was not a possibility he considered. Instead, he focused his attention on attempting to resolve the issue by using other computational objects within his field of awareness to re-establish communication via alternative channels. Indeed, this may have been a ‘rare event’ for Walt that ‘trigger[ed] learning because [...] it expose[d] weaknesses and reveal[ed] unrealized behavioral potential’ (Christianson et al. 2009, p. 846).

Meanwhile, Ari, in response to the system crash, flipped his iPhone™ over and called the number of the colleague he had just been disconnected from. The lag between the time of the system crash and the reconnection did not exceed 30 seconds. Once reconnected, he relied on his colleague to verbally lead him to where they were in the slide deck, since the voice call alone did not provide a visual reference to the slide deck. This was arguably slower and less efficient than using a screen to reference the material, however, it worked, and it had the overall effect of reframing the breakdown, making it unimportant. Through Ari’s selection of action, the breakdown was effectively jettisoned; he improvisationally selected another computational object that was arguably not as well-suited as the previous one given the lack of visual capability, however, it worked—it enabled the communication to be maintained and the joint work to be progressed through an impro-

visational refocusing into/through another computational object.

One might think that previous experience may have something to do with these differences. Following this logic, I discussed this idea with Ari after the incident and he reported that this sort of thing had happened when he was in other remote locations, suggesting that he had learned from those previous experiences. Yet, Walt also told his colleague, once the power was restored, that he had experienced something similar before and said that he felt that he had been viewed as a ‘hacker’ when he had previously gone to an Internet café to re-establish communications. So it is not the case that Walt lacked the experience. Reading both situations diffractively through the lens of Ciborra (2004), the improvisational and hacking elements that can lead to ‘radical innovation’ (*ibid.*, p. 29) were present in both, but failed to materialise for Walt.

It would also be easy and predictable to generally critique what could be called a lack of preparedness in the face of this interruption and argue that Walt should have ensured he had the phone number to the other location and that if he was going to use two-step verification (Google 2013a) that he should have had the authentication application set up on his phone so that he could log in when necessary. And perhaps Walt should follow such advice, however, my point is broader than a knee-jerk ‘blame the leader’ analysis. Here Grint observes that:

[W]e seem to have a problem with Nietzschean anxiety over the determination of causation. In other words, when situations appear both threatening and ambiguous we seem to demand a clear causal agency; because if we cannot establish this agency then ‘the problem’ is potentially irresolvable [...] In the presence of such a potential conclusion the tendency seems to be [...] to find ‘the culprit’ by looking harder, not to accept the conclusion. In short, such intolerable Nietzschean anxiety guides us back into the search for a commander to resolve the irresolvable crisis (2010b, pp. 24-25).

Instead, I would like to propose, following Grint, that we look elsewhere for other explanations for these different outcomes. Specifically, I’d like to hone in on the leadership dimension of *purpose* (see figure 2.4 on page 32), and make some comparisons between what was observed between Walt and Ari that suggest different orientations to purpose. Through the remainder of this analysis, I will show that different purposes produce different leadership outcomes.

Specifically, recall that Walt has an uninterruptible power supply (UPS) as part of his array of equipment to support remote pairing.⁷ It is clear, when hearing Walt speak about the process he went through to set up the remote pairing console, that he has given

⁷See page 175 for this description.

a great deal of thought and attention to the selection of the equipment in service of the remote pairing practice. In particular, the provisioning of a uninterruptible power supply (UPS) suggests that specific thought has been given to power failures. However, Walt's purpose in having a UPS for a potential power failure may have been to protect the computational technology and data being worked on in the event of a power failure rather than the preservation of communication with other humans. Indeed, it was observed that Walt did move to shut down his main computer shortly after the power failed and did this *before* he attempted to reconnect with his human colleague. One way this can be interpreted is that Walt prioritised the computational object *over* the human—that his purpose resulting from his thinking about power failure was to protect the computational objects from damage rather than protect communications from being severed.

In contrast, while Ari, being a programmer himself, was adept with technology, his purpose can be interpreted as being much more human-centric. When his machine enacted the system crash, he did not even try to restart the machine until *after* he flipped his phone over and had his caller back on the line. His apparent purpose was human communication over computational recovery.

This interpretive subtlety, if accurate, tells us a lot about the ways in which purpose relates to leadership practice. Purpose is about ends or goals and, from the perspective of human behaviour, appears to drive the means to achieve them. Thus, a purpose to protect the computational technology drives actions that serve those ends but do little to re-establish the communication that the power failure severed. Meanwhile, Ari's singular focus on human communication led to a different set of actions that were more effective than Walt's in terms of maintaining the conversation.

Thus, based on the informant's response, in Walt's case, we have a *total breakdown* (Dreyfus 1991, pp. 79-83) while in Ari's we have a *temporary breakdown* (*ibid.*, pp. 72-79), with the difference between them being the underlying purpose each individual held with respect to the context. The implication here is that when a 'breakdown' occurs, that it is only seen as a breakdown in relation to people's response to it. Given two similar circumstances, as I have shown, an improvisational response can lead to a swift resolution, virtually obscuring the breakdown from experience (Yanow and Tsoukas 2009, p. 1357). In the other case, I have shown that some responses can lead to a 'freezing up' that, in a very important sense, is the substantiation of a breakdown. Hence, if the 'freezing up' can be avoided, it is less likely the event will be understood as a breakdown.

For these reasons, I argue that the leadership dimension of *purpose*, as depicted in figure 2.4 on page 32, is crucial to include when considering the differences in a human leadership responses to a breakdown involving a computational object. Further, I am arguing that the same human response to the breakdown is a critical component in

determining whether such a breakdown is *total* or *temporary* (Dreyfus 1991, pp. 72-83).

Due to indeterminacy, while it can never be guaranteed that a given response will produce an outcome that transforms a breakdown into one or the other category, the data suggests improvisational attempts to switch to another mode are more fruitful than ‘freezing up’, in that ‘freezing up’ cannot offer a transformative frame through which the breakdown is later experienced as *temporary* (*ibid.*, pp. 72-79). In other words, while an improvisational response may not succeed, ‘freezing up’, by its very nature, has no hope of transcending the threshold between *total* and *temporary* breakdown (*ibid.*, pp. 72-83).

Moreover, the arguments I have presented in this chapter are an attempt to make good on Sandberg and Tsoukas’ call to develop more open-ended theories that are in alignment with the logic of practice (2011, p. 339), that is, the local logics in place where the practice is observed. Thus, the theoretical perspective I have offered here suggests that the way a leader responds to a breakdown in practice is a significant determinant of whether it will ultimately be considered as *temporary* or *total* (Dreyfus 1991, pp. 72-83). It invites the reader to consider the role of *purpose* (see figure 2.4 on page 32), both for the human and the computational object plays. For the human, this chapter shows that purpose makes available certain choices to the person making them, while occluding others. For the computational object, the breakdown maligns the purpose of the object, disrupting the subject-object relationship and forcing the human to either circumvent the breakdown or become mired within it.

These are views that resonate strongly with the actor-network theory (ANT) conception of objects ‘striking back’ (Latour 2000), however, in my view, what events such as those reported in this chapter really begin to touch on is the notion of *agency*. If, as Callon suggests, ‘a veritable battle is being fought’ (1986a, p. 11) between various non-human objects and humans in pursuit of the latter’s goals, this raises the question of the agency of the objects. More radically, Barad suggests a view of agency that permeates all matter when she suggests that:

[M]atter plays an agentive role in its iterative materialization. This is an important reason, but not the only reason, that the space of agency is much larger than that postulated in many other critical social theories (2007, p. 177).

For this reason, this question of a reconceptualisation of agency is one I take up in chapter 7.

6.5 Summation

In this chapter, I have focused on breakdowns as a means to better understand an everyday aspect of leadership—the choices people in leadership positions make regarding computational objects as part of their material-discursive practice. I have presented two different cases where breakdowns transformed the relationship between subject and object and unfolded with entirely different outcomes.

In the first episode presented, I showed how the decisions made led to a state of ‘freezing up’ on the part of the subject and, where the relationship between subject and object remained, as Verbeek refers to it, ‘disturbed’ (2005, p. 80). This state can also be described as a sort of paralysis where the subject was unable to move forward and was, therefore, at the mercy of the breakdown. Further, the subject in question was noted to have become agitated and to have remained so for some time after the power came back on, a response that appears to be linked to the perception of the breakdown. For these reasons, I suggest that this case is aptly described as a *total breakdown* (Dreyfus 1991, pp. 79-83) where leadership practice does not have the desired impact.

In the second episode, I presented a very similar set of circumstances where a similar breakdown also interrupts the relationship between the subject and the computational object, which, at the point of the interruption, plays the role of the projective mechanism through which a conversation with a business associate (as well as specific information being discussed in the meeting) is focused, making it the locus of attention for the practice (Guimbretière 2002, pp. 15-19, 2003, p. 53). This has been a consistent role for the computational object throughout observations, as also evidenced in chapters 4 and 5. When breakdowns disrupt this role, this presents a challenge to on-going leadership practice.

When Ari’s system crash occurred, these projective and focalising functions of the computational object effectively withdrew, and the computational object no longer played this same role. Throughout the breakdown, its relationship to the subject changed profoundly. However, unlike the first case, the person faced with this breakdown identified another computational object with slightly lesser capabilities and effectively employed it to re-establish the conversation in a mode I have characterised as improvisational (Yanow and Tsoukas 2009, p. 1357). I have argued that this improvisational response opened the possibility for lessening the impact of the breakdown to be lessened, transforming it into a *temporary breakdown* (Dreyfus 1991, pp. 72-79).

While not arguing for a prescriptive stance in the sense that a standardised response will guarantee an improved outcome, I do argue that an improvisational response (Yanow and Tsoukas 2009, p. 1357) is superior to freezing up’. This is because improvisation, at the very least, offers the possibility of circumventing the breakdown, whereas

‘freezing up’ does not. However, such ‘freezing up’ can provide important learning experiences from which the person can later recognise and to better address future situations (Christianson et al. 2009, p. 846).

In addition, I have argued that the leadership dimension of *purpose* as depicted in figure 2.4 on page 32, is a useful lens through which to explore these starkly different responses. I have offered an interpretation that places *purpose* as a crucial mechanism for providing a way of seeing the world, whereby certain possible choices are made visible through their identification with *purpose*.

This theoretical view not only provides a plausible explanation for the observed phenomena (Weick 1989, p. 517), but may also hold more generalisable implications; that *purpose* may also play a similar role of making available possible choices in any and all material-discursive practices, not merely those associated with the computational object.

And finally, by exploring these episodes, I touched on questions of agency these cases raised and possible reconceptualisations that may be useful in light of the data presented throughout. These are questions I take up in greater depth in the next chapter.

Chapter 7

Reflections and Diffractions

Indeterminism [...] admits that possibilities may be in excess of actualities, and that things not yet revealed to our knowledge may in themselves really be ambiguous. Of two alternative futures which we conceive, both may now be really possible; and the one becomes impossible only at the very moment when the other excludes it by becoming real itself (1897 / James 1979, p. 116).

According to well-established principle, when we accept an idea which was once controversial, we like to forget its origins. We prefer to think of it as eternal. But the idea of technological innovation as an integral part of corporate activity is only about fifty years old (Schön 1967, p. xiv).

THE THREE PREVIOUS EMPIRICAL CHAPTERS have offered distinctive vantage points for the interrogation of the relationship between computational objects and leadership practice. In chapter 4, I located this relationship in the practice of pair programming (Williams 2001). This approach showed both how leadership is performed as well as offering evidence demonstrating how leadership is produced and recognised by members. Then in chapter 5, I explored approaches formal leaders take with their email, explicating some of the implications of these human-computer engagements for leadership practice. The view of leadership described in chapter 5 challenges traditional accounts, being less attached to an individual and more dependent on various approaches to—and therefore distributions of—material-discursive practice (Barad 2007, p. 178; Shove et al. 2012b; Nicolini, Mengis et al. 2011, p. 8). Finally, in chapter 6, I followed the call of Sandberg and Tsoukas (2011) to employ breakdowns as a site to further delineate the relationship between leadership practice and computational objects. Specifically, this approach revealed how leadership practices are enacted through, and dependent on, compu-

tational objects, while simultaneously highlighting the role of human decisions in these enactments.

The objective of this chapter is to take a step back from the specific cases presented in each of the three previous chapters and coalesce what has been learned. Thus, I bring together the threads of analysis, synthesise the findings arising from these, and present my own original theoretical contributions, as well as reflecting and diffracting (Barad 2007, pp. 86-94; Nicolini and Roe 2014) these through extant theory. This approach, according to Barad, involves:

[A]ttending to and responding to the details and specificities of relations of difference and how they matter [...] in order to produce a new way of thinking about the nature of difference, and of space, time, matter, causality, and agency, among other important variables (2007, pp. 71-73).

This closing chapter is organised in the following manner: First I revisit the motivation and principal interest with which this study has concerned itself (section 7.1). I then present the findings of the study, which include an elaboration of an original theoretical perspective on leadership that allows for the role of computational objects in leadership practice (section 7.2). In particular, I present a range of roles built on Ihde's human-technology relations (1990) that have been encountered in this study. These roles provide a framework to explain *how* computational objects are accommodated in their enactments of leadership practice. In addition to this analysis of roles, I also present two original theoretical accounts that explain *a*) how leadership is changing in relation to its enactment through computational objects and *b*) how leadership is produced in practice. The first elaborates on a disjunction of authority and responsibility resulting from the delegation of authority to computational objects. This theory builds on Barad's agential realism to sketch the theoretical outlines of a *posthuman* leadership. The second presents a citational (1993 / Butler 2011, pp. xxi-xxiv; Derrida 1977, p. 18) model that explains how members produce, recognise, and reify leadership in practice. I then proceed to a discussion of the implications of both the findings and the original theories I propose in terms of the extant literature (section 7.3). From here, I move on to a discussion of the limitations of the present study (section 7.4), suggestions for future research (section 7.5), and the overall contributions of this research (section 7.6). I then conclude the dissertation with some closing remarks (section 7.7).

7.1 Research Motivation and Principal Interests

Bounded within this dissertation, I have set out to chart a territory on which little research has been conducted, the relationship between leadership practices and computational objects. This work has been motivated by a gap in the literature, where a broad range of studies show that the introduction and presence of computational technology within the workplace have profound impact on the practice of work (cf. Bailey and Leonardi 2015; Barley 1986; Clark et al. 1990; Leonardi 2011; Markus 1994; Miller and Slater 2000; Mumford and Banks 1967; Nicolini 2011; Orlikowski and Yates 1994; Zuboff 1988). Such technologies are ubiquitous and said to be involved in an ever-increasing range of work practices (Barley 1988, p. 33; Zuboff 1988, pp. 124-126), and yet, when turning specifically to the leadership literature, there is very little empirical work to be found on exploring the relationship between leadership practice and computational objects (Avolio, Walumbwa et al. 2009, pp. 440-441; Lowe and Gardner 2001, p. 501; Kahai 2012). In this sense, the present study contributes to the leadership literature by providing an empirical basis for understanding this unexplored relationship (Kahai 2012, p. 102).

7.2 Findings

The principal findings from this study address the research questions presented in section 1.3, which, to remind the reader, are:

1. What roles do computational objects play in the enactments and possibly the creation of leadership practices?
2. How do informants' perceptions and use of computational objects align with respect to the constitution, (re)production, and articulation of their leadership practice?
3. How is 'leadership' produced and recognised *qua* 'leadership' in practice?

To address these questions, within this section, I describe and interpret the following central findings: *a*) computational objects are entangled with leadership practices (section 7.2.1); *b*) humans tend to overlook computational objects and their authoritative roles in leadership practices, leading to a disjunction of responsibility from authority in such delegation (section 7.2.2); and *c*) when leadership does materialise, it does so through specific citational material-discursive practices (section 7.2.3). I now proceed to elaborate on each of these findings in greater depth.

7.2.1 Computational Objects Are Entangled in Leadership Practice

Within this study, a number of sites have been observed where people spend a lot of time working with one another and with computational objects. In some cases, the people who have been observed are formal leaders and, in some cases, they are not. Yet, even when they are not formal leaders, evidence suggests what they do during their day-to-day work is often recognised as leadership practice by formal leaders in their organisation.

In chapter 4, for example, I followed both humans and computational objects involved in pair programming. In this setting, no formal leadership role was assigned to a human, however, there was evidence from senior management and employees alike that the practice of pair programming at [Eta](#) was viewed as a leadership practice within the organisation. In this setting, both the humans who worked remotely, and the humans who worked together, physically used computational objects as a means to constitute their working environment. All the people observed in the pair programming environment employed networks of computational objects as tools of their trade. In fact, very little of their work was done—or could be done—without these computational objects. This chapter also demonstrated how computational objects possess the agentive power to act and influence human behaviour, to reverse the traditional subject-object relationship and, most provocatively, to assume a role, enacting a practice that historically would have been enacted by a human leader.

Then, in chapter 5, I explored practices formal leaders engage in with their email. I looked both at formal leaders who employed computational objects extensively and those who did not, comparing the differences between them. In the process, I was able to reveal networks of production where, for example at [Eta](#), the executive assistant (EA), senior executive team, and their computational objects were intimately involved with the production of the COO's email. This chapter also revealed that certain practices, such as the management of the COO's calendar by the EA, evoked a form of language from the COO, assigning leadership to the EA and placing her in a hierarchically superior position to the COO. Comparatively, even in the case at [Epsilon](#), where the CEO avoided engagement with computational objects at work, it was revealed that the computational object became a backstage partner (Goffman 1956, p. 69), where the CEO found herself engaging with computational objects during in-between times and at in-between places, such as on airplanes and at home during nights and weekends.

And finally, in chapter 6, I showed how practices of leadership were disrupted by temporary and total breakdowns (Dreyfus 1991, pp. 71-83) involving computational objects and human responses to them.

What is common to all of these cases is the rhizomatic presence of computational objects. In each and every case, computational objects were deeply embedded in work

Role	Description	Empirical Basis
Focal	In this role, the computational object acts as the primary locus of human attention (Guimbretière 2002, pp. 15-19, 2003, p. 53). This role is enacted whenever the user is engaging with the computational object as part of their work practice, where such engagement is prefaced on the user focusing on the computational object in an attentive fashion, involving visual, auditory, or through motor-coordination focus. This is a primary role; many of the other roles can be simultaneously enabled if this role is active.	<ul style="list-style-type: none"> ● chapter 4 ● chapter 5 ● chapter 6
Intermediary	In the role of an intermediary, the computational object provides access to something or someone else. Enactments include accessing data, which, in many cases, represent forms of communication with other people.	<ul style="list-style-type: none"> ● chapter 4 ● chapter 5 ● chapter 6
Recorder	The role of recorder is enacted when a user offers data to a computational object for processing. Such data can be symbolic, as in alphanumeric key presses, mouse-clicks, or involve the use of video or audio input through a variety of networked devices.	<ul style="list-style-type: none"> ● chapter 4 ● chapter 5 ● chapter 6
Projector	The role of projector is the inverse of the recorder. It is enacted whenever the user receives data from the computational object for interpretation. Such data can be offered in many forms, including screen rendering, audio output, or printing.	<ul style="list-style-type: none"> ● chapter 4 ● chapter 5 ● chapter 6
Authority	The authoritative role is enacted when the user defers to the computational object as a command authority (Air Command and Staff College 2005; Grint 2005b, p. 1477) or enacts control over the user (Haraway 1991a, pp. 188-196).	<ul style="list-style-type: none"> ● chapter 4 ● chapter 5 ● chapter 6
Disruptor	The role of disruptor is enacted when the computational object violates the user's expectations in some fashion through a provocation interpreted by the user as a possible breakdown (Dreyfus 1991, pp. 71-83).	<ul style="list-style-type: none"> ● chapter 6

Table 7.1: Analytical Summary of the Roles of Computational Objects

practice. The computational objects played a variety of roles at a many levels, from recorder to projector, from communication device to task list manager, from authoritative to fallacious calendar, from being the focus of attention to being the point of focus for on-going decision-making. Moreover, the roles that the computational object played in these material-discursive practices were often simultaneous, as when a screen was shared by two people (projector) for the purpose of doing their work (recorder). Thus, within the empirical findings is a profound fluidity with which the role of computational object may simultaneously enact.

The Roles of Computational Objects Thus, from across the empirical chapters, and building on the work of Ihde and his theoretical conception of human-technology relations (1990) as outlined in section 2.3.7.3, I have analysed the following general roles computational objects were found to have played. These are: *a)* focal, *b)* intermediary, *c)* recorder, *d)* projector, *e)* authority, and *f)* disruptor. These roles are outlined in table 7.1 and are offered as a starting point to chart the entanglements between leadership practice and computational objects.

The first role, *focal*, expresses a mode of engagement between a computational object and a human, where the computational object provides the dominant field of attention for its human user(s). This role builds on the overarching *focal* category of Ihde's first three dimensions of human-technology relations as presented in table 2.5. In this mode, the computational object becomes what Guimbretière refers to as a 'locus of attention'

(2002, pp. 15-19, 2003, p. 53). Evidence of such *focal* roles played by the computational object were presented in all three empirical chapters. For example, in chapter 4, the remote pair programming between Walt and Robert was constituted as presence through the computational objects. Walt and Robert were in fact thousands of miles apart from each other; and yet, each talked and interacted with the other as if they were in the same room. In chapter 5, a *focal* role enabled Sebastian and Ruby to track the various emails that needed response to and to execute on the goal of a *zero inbox* (Mann 2006). And in chapter 6, Ari demonstrated how the *focal* role can easily be shifted from one computational object to another when he so deftly called Maureen on his iPhone™ after his MacBook Air™ experienced a system crash.

On the one hand, a *focal* role as I am describing is a prerequisite, enabling the usage of a computational object, but on the other, it closely approaches Kittler's depiction of the practice of reading text as a 'hallucination' (1999, p. 151); that is, once engaged with the computational object in the *focal* mode, the user's field of attention is subsumed (Ihde 1990, p. 47). It is therefore not an overstatement to say that particular realities are made manifest through the *focal* role. I refer to the *focal* role as a *primary* role because the remaining roles are particular manifestations of a *focal* role. In this sense, my analysis diverges from Ihde's in that I am not looking at human-technology relations *per se*; rather, I am exploring specific manifestations of the roles computational objects play in the enactment of leadership practices. Thus, rather than zooming out like Ihde, across all possibilities, I zoom in on the phenomenon at hand (2012, pp. 219-239).

The *intermediary* role is characterised by a condition where the computational object plays the role of gateway to a desired resource, such as a file or an email, but can also include multimedia data, such as video conferencing. The *intermediary* role is enacted when a human wants to establish a connection with some particular data and takes steps to make that connection. This was evidenced in chapter 4 when Walt was attempting to use various computational objects to set up a conference call for the stand-up meeting. It was also present in chapter 5 when Sebastian clicked on certain attachments in emails to review their content. And in chapter 6, it was evidenced when Ari opened a particular presentation file for his discussion with Maureen. Thus, the *intermediary* role is characterised by the human acknowledgement of the computational object's positional relation to desired data which are, in some cases, such as the electronic discussion board described in chapter 4, available exclusively through particular computational channels. In establishing such structures, the computational object is deemed to play an *intermediary* role in being the primary means of access to that data.

The *recorder* and *projector* roles are paired inverses of each other. These roles respectively isolate particular 'technological intentionalities' (1990, p. 103) that are observ-

able by computational objects, allowing for a variety of engagements. The *recorder* role was evidenced in chapter 4 when Walt and Robert wrote code together and when they subsequently checked it in to the source control system. It was also present in chapter 5 when Sebastian wrote emails and Ruby entered appointments through the Google Apps™ platform. And it was visible in chapter 6 when Ari allowed the computational object to record and then transmit his voice and image to Maureen during a conference call with her. The *projector* role was also evident in each of the empirical chapters. In chapter 4, the build monitor turning red is a prime example. In chapter 5, users who viewed Sebastian's calendar (including Sebastian and Ruby) are the beneficiaries of projection. And in chapter 6, the empirics show that Walt relied entirely on his computational object to project and, through this projection, *materialise* his relationships with his remote co-workers.

The *authority* role is enacted when a user defers to the computational object as a command authority (Air Command and Staff College 2005; Grint 2005b, p. 1477) or where the computational object enacts control over the user (Haraway 1991a, pp. 188-196). This occurred in chapter 4 when the computational object turned red and the people in the room responded in kind by attempting to determine which pair of programmers had introduced the problem detected by the computational system. In chapter 5, Ruby, by participating in a rule-based, structured calendar system through her computational objects, was shown to be subject to its mechanisms and worked within these by following particular steps. Following Orlikowski here, the computational object *choreographed* (1996, p. 65) her activities in all of these aspects. And, in chapter 6, the *authority* role was present when during a power outage at Walt's location, where he encountered further computational 'barriers' in the form of the two-step verification (Google 2013a) he was unable to cross. This conundrum only occurred because Walt explicitly granted the computational system this kind of authority to keep potential hackers out of his account. Little did he realise that later on, this would prevent him from accessing his own account when he needed it. In other words, in granting the *authority* role to his computational object, he inadvertently was subjected to that authority in a way he had not anticipated. Ihde refers to such manifestations as the 'quasi-hate underside' of a 'quasi-love relationship' with technology (1990, p. 106).

And finally, the role of *disruptor* applies when the computational object violates the user's expectations in some fashion through a provocation interpreted by the user as a possible breakdown (Dreyfus 1991, pp. 71-83). This was evident throughout chapter 6, where both episodes explored precisely how humans responded to such provocations, to the decisions these humans made in response to those provocations, and to the outcomes that were then materialised.

Based on the elaboration of these various roles, which delineate with some degree

of granularity just what roles computational objects play in relation to leadership practice, I suggest that these roles may be more general than any relation they have to leadership practices. Thus, I argue here that it is on the basis of these roles, and the specific affordances they enable, that many of the material-discursive practices encountered throughout this study were accomplished at all. I suspect that these roles may well transcend the purview of leadership practice to a much broader range of organisational practices, such as strategy and innovation.

Irrespective of this conjecture, what these roles demonstrate is a level of support for a principle finding of this study: Computational objects are entangled in enactments of leadership practice. In fact, they are so entangled that in some cases it may be impossible to accurately determine the precise boundaries between human and computational object. For example, when an email is sent from the COO to the entire staff, engagement with the COO is projected through the computational object. While recipients of the message may identify with the COO, the email hides the other people involved in writing and various parts that computational objects play in enacting these material-discursive practices, including the possibility to read the message.

In many ways, this phenomenon is not new, and must be acknowledged as an extension of previously reported phenomena arising from the introduction of various technologies in the workplace (cf. Yates 1993, 2008; Zuboff 1988). What makes this finding unusual, however, is how it is located in a study that relates the phenomenon specifically to leadership practices. Moreover, the presence and particular deployments of these computational objects leads to some additional novel outcomes not seen in previous deployments of organisational technology. I describe these below.

7.2.2 The Disjunction of Responsibility from Authority

Despite the ongoing presence of and participation with computational objects, there appears to be a sort of ‘blind spot’ with respect to computational technology. This was evidenced, for example, in chapter 5 I discussed how differences between the ways the various executives engaged with computational objects, arguing that this revealed an aspect of a ‘technological unconscious’ (Clough 2000, p. 2). Under this view, the use of a computational object tends to fall into particular habits that, in many cases have, not been exposed to the same levels of formal analysis that the same leader might apply to a finance or human resources decision. This suggests that the way many humans think about computational technology in their daily lives is not fully considered.

Correspondingly, the data in this study was consistent in showing that humans do not project the quality of leadership onto these objects. Instead, ‘leadership’ was a qualitative description reserved for humans or specific practices with which they engaged.

For example, in chapter 4, data was presented on page 121 that came from an internal electronic discussion board at Eta and accessed through computational objects. These data linked the practice of pair programming to positive changes in ‘both engineering leadership and process’ (Eta Internal Discussion Database). However, the citation of leadership here is intended to describe the leadership of *human* engineers, not the machines they use to accomplish their work.

Where this was most salient was the case presented in section 4.3.3 where the computational object, acting as build monitor, was granted an authoritative role to intervene in practice. Its role here was to alert the human group of users to possible errors introduced into the code base. Like a teacher or a manager, the computational object in this case evaluates work that has been submitted by humans and issues feedback to the group, sometimes resulting in direct commands to stop what they are doing and attend to a problem that it detected. In so doing, it fulfils a particular *position* (as depicted in figure 2.4 on page 32) in the organisational hierarchy. This accomplishment involves a subtle but crucial shift from the canonical relation of computational object as tool, where the user is the subject, and the computational object is the object, whose being is subordinated to the human (1927 / Heidegger 1996, pp. 64-67).

Thus, despite the authoritative or command role (Air Command and Staff College 2005; Benoit-Barne and Cooren 2009; Miller 2008) the computational object played in this scenario, thereby legitimating the possibility for citing leadership through the dimensions of *result* or *process* dimensions (as depicted in figure 2.4 on page 32), such citations did not come to pass. Of this practice, the humans did not assign the category of leadership to the computational object.

Similarly, in chapter 5 on page 148 we find that Ruby, Sebastian’s executive assistant (EA), works closely with her computational objects and has worked out a strategy whereby she enters dummy appointments on his calendar so that internal requests for Sebastian’s time are more tightly controlled. I suggested that in this material-discursive practice, Ruby is led *by* the computational object in the sense that her participation within the Google Apps™ platform requires her to follow certain steps in order to maintain a calendar. In other words, by participating with the computational object in a rule-based, structured system, she becomes subject to its mechanisms and must work within them by following particular steps. Following Orlikowski here, the computational object *choreographs* (1996, p. 65) her activities in all these aspects. In this sense, Ruby is led by the computational object to accomplish such tasks through mail notifications, calendar alerts, and other computationally supported mechanisms. However, despite whatever logic my argument may hold, it is crucial to understand that Ruby did not speak of this relationship in terms of leadership, nor did Sebastian or any of the other informants at Eta.

Accordingly, across the data I collected, and irrespective of any role that the computational object played, humans did not ascribe leadership to computational objects. This is despite the paradoxical fact that those very objects are now placed in roles where they enact practices formerly enacted by human leaders.

In addition to raising an interesting question that speaks to sceptical constructivism (Grint and Woolgar 1997, p. 143), a view that seeks to understand how it is that certain views come to be accepted, this absence actually reveals something important to us about how leadership is mobilised and constituted in practice.

Perhaps it is simply a question of novelty. For while machines have been around for some time, computational objects and the realities they constitute have become a widespread phenomena only in the last quarter century. Indeed, the epigraph by Schön opening this chapter reinforces the novelty of computational innovation within the corporation as being a recent phenomenon (1967, p. xiv). One way to frame this recent development is to categorise the placement of computational objects in the kinds of leadership positions described in section 4.3.3 as a side-effect of their deployment, where the traditional functions of leadership are agentially cut (Barad 2003, p. 815) and extended beyond the boundary of the human towards a form of leadership that could be called *posthuman*, a view that attempts to address the historic privileging of the human perspective by including perspectives which go beyond the human.¹

In other words, when computational objects are assigned positions of authority with the label 'leadership' withheld, this highlights a disjunction of responsibility and authority that is traditionally associated with leadership. For according to MacGregor:

[A] leader cannot avoid the exercise of authority any more than he can avoid responsibility for what happens to his organization (MacGregor quoted in Bennis 1959, p. 261).

The empirics presented in this study demonstrate computational objects being placed in roles of authority without receiving the citation of leadership, thus violating MacGregor's dictum. Therefore, from the perspective of agential realism, as the boundary of what *kind* of objects authority can be delegated to has expanded, the phenomena produced by particular arrangements of apparatuses (2007, p. 140) is altered from its historical materialisation. Responsibility is now decoupled from authority. Heretofore, when delegating leadership authority to another human, with that authority also came responsibility. Yet, what this study reveals is through the (re)configuration that enables humans to delegate authority to computational objects, a novel state has emerged where computational

¹See section 2.3.5 for an elaboration of a posthuman perspective.

objects are placed in authoritative roles but are not necessarily seen as responsible for the actions they undertake.

I suggest that this finding materialises a newfound space of indeterminacy that was not a logical possibility before the deployment of semi-autonomous computational objects in authoritative positions. Exactly who—or what—might be responsible is now open to interpretation, as exemplified in a number of high-profile cases. One example is the BP Deepwater Horizon explosion, where complex interactions between humans and computational systems are understood to have caused the explosion, while subsequent investigations sought a human-corporate actant to take responsibility (Balmer et al. 2011; Pelley and Williams 2010). Another is the case of the *News of the World*, where ‘phone-hacking’ was the operative term, enacted through and toward other computational objects, while legal proceedings focused on identifying humans that were ‘responsible’ (Logue and Clegg 2015). I submit that in each of these cases there are important deployments of computational objects in authoritative roles that are consistent with the findings of this study. Together, these suggest we are now entering an age of *posthuman* leadership where questions of responsibility become increasingly crucial to consider, and yet, as these debacles demonstrate, can also be quite difficult to determine. Given such circumstances, I suggest that what computational objects *enable*, in terms of expanded delegation of authoritative capability, appears to have an associated side-effect: the obscuring of important questions of responsibility such as *who—or what—is in charge?* Thus, the *posthuman* view of leadership I propose here suggests that in this separation of authority from responsibility ‘leadership’ is being (re)configured to include computational objects in ways that distribute leadership while simultaneously obscuring it.

On this point of the expanding agential boundaries of computational objects and associated disjunction of responsibility from authority, scholars have explored similar questions for the class of computational objects employed by nations as thanatological devices for warfare (cf. Sharkey and Suchman 2013; Suchman 2013; Suchman and Weber 2014). According to their argument, when the practice of nation-sponsored warfare is enacted through/with autonomous machines that allow killing at a distance such as drones, traditional interpretations of accountability and responsibility are dubious at best. Their work argues it would therefore be useful to rethink the social constructs of accountability and responsibility that are impinged upon as a result of these changes.

I suggest a similar logic is applicable to the present finding, where in this study, computational objects are observed to enact roles of authority and yet there is neither discussion nor recognition of leadership in practice. I would therefore propose that the categories of *accountability* and *responsibility* found in Suchman et al.’s research be aligned with the concept of *posthuman* leadership I present here. In other words, as computational

technology begins to increasingly participate in leadership practices, taking a more substantive role, it becomes important to re-think the concepts that have previously been applied only to humans, such as ‘leadership’. A *posthuman* view of leadership asks us to recognise the differences that delegation to computational objects enables and constrains with respect to a disjunction of responsibility from authority, to consider to what degree the concepts of leadership and responsibility might apply to computational objects and human beings, and how these (re)configurations alter the meanings and materials of leadership. In particular, my proposal of the term *posthuman* leadership signals an explicit acknowledgement of the disjunction between traditionally bound authority and responsibility in leadership practice where delegation to computational objects materialises a more complex space where who—or what—is responsible is open to broader interpretation.

Indeed, it is on the basis that computers have been created to be more like humans, with the addition of technologies such as the graphical user interface (GUI) (Bewley et al. 1983; Jørgensen 2008) and the mouse (Engelbart 1962), that we work with them at all. The entire premise of human-computer interaction (HCI) is to enable humans to interact with computational objects as they do *with one another*: through everyday language and indexical gestures (Myers 1998). In other words, in bringing the term ‘ease-of-use’ (Adams et al. 1992) into the popular vernacular, computers have materialised more like us, that is, more *human*. I argue it is *this* achievement that has enabled the entanglement of these objects so firmly into contemporary human experience, which is evidenced by the material-discursive practices of delegating to them roles of authority.

Interestingly, while scholars have written extensively of leadership as being ‘distributed’ (cf. Bolden 2011; Denis, Langley and Sergi 2012; Harris 2008) or ‘stretched over [...] social and situational contexts’ (Spillane et al. 2001, p. 23), this perspective does not generally include non-human objects as part of its theorisation. Moreover, the interpretation of ‘distributed’ leadership is made in these studies irrespective of whether the members they studied saw leadership that way or not. That is, these are, on inspection, researcher-generated citations of leadership.

On this first point, even the more ‘modern’ theorisations of leadership, of which ‘distributed leadership’ is among, focus on human actors at the expense of exploring the networks of humans and non-humans out of which the phenomena arise. Actor-network theory (ANT), one of the theoretical frames this study has deployed would instead remind us to be attentive to:

The attribution of human, unhuman, nonhuman, inhuman, characteristics; the distribution of properties among these entities; the connections established between them; the circulation entailed by these attributions, distributions and connections; the transformation of those attributions, distributions

and connections, of the many elements that circulates and of the few ways through which they are sent (Latour 1996b, p. 75).

Here, Latour is framing the central concerns of ANT, where the distribution and transformation of some social quality can be explored. For him, the ‘network’ is the space in which that investigation must take place. Moreover, he demarcates the space explicitly as *posthuman*, that is, a space that must necessarily go beyond the human. Similarly, Barad’s notion of the ‘apparatuses of bodily reproduction’ (2007, p. 178) refers to precisely the same ideas, namely that apparatuses, in the Baradian sense, are the Latourian network or assemblages that appear as black boxes and must be explored (Latour 2005, p. 39).

Consequently, that scholars of distributed leadership have not taken the notion of ‘distribution’ as an invitation to explore symmetrical networks of *both* people and objects, that they have not attempted to understand the apparatuses that produce the phenomenon, and, as a result, have not opened these black boxes up for inspection, is, I suggest, another instance of this finding in another site—the academic literature. I suggest that these leadership scholars align with the informants within this study in avoiding the ascription of leadership beyond the human.

This second point actually takes us to the third finding of this chapter, because when scholars studying distributed leadership interpret the phenomenon of ‘distributed leadership’ irrespective of whether the members they studied saw leadership that way or not, they are engaging in precisely the behaviour that Latour describes above, namely the ‘attribution of human, unhuman, nonhuman, inhuman, characteristics’ (1996b, p. 75). This links directly to the work of Pfeffer, whose work I discussed in section 2.2.3. In my review of Pfeffer’s work, I reported that he suggested a more fruitful direction for the study of leadership would be to investigate the *process* of how such attributions of leadership are made (1977, p. 104). In this sense, I am arguing for an ethnomethodological interpretation of leadership where:

[T]he principle that any social organization or communal gathering, however mundane or exotic, simple or complex, is a local and thus thoroughly *endogenous* production (Szymanski and Whalen 2011a, p. 6).

In sum, what the absence of ascriptions of leadership to computational objects reveals are twofold: *a*) computational objects are increasingly placed in authoritative roles, materialising a disjuncture between authority and responsibility; *b*) the phenomenon labelled ‘leadership’ is produced through citation. I elaborate on the latter finding in the next section.

7.2.3 Leadership is Produced Through Citationality

The previous finding highlights the absence of leadership and in so doing, reveals to us how its presence is produced; namely, that which is recognised as leadership is materialised through citational (1993 / Butler 2011, pp. xxi-xxiv; Derrida 1977, p. 18) material-discursive practices. Here I suggest that leadership is mobilised as a symbolic resource (Ailon-Souday and Kunda 2003), standing for particular values within the context of a community, such as an organisation. This is due, I argue, to a practical extra-ordinarisation of ordinary practices (Alvesson and Sveningsson 2003b). In this view, 'leadership' is constructed through empirically observable enactments of material-discursive practices which, successively, transform ordinary practices into instances of leadership. I argue that leadership necessarily emerges from this encounter of ordinary practices of organising and other equally ordinary practices of signification and categorisation (Bowker and Star 1999; Zuckerman 1999). However, as only a limited number of such practices are considered legitimate in the Western world, based on historical precedence and a negotiated understanding of value and worth (Boltanski and Thévenot 2006). Thus, leadership tends to be produced in certain ways and not others.

In other words, leadership, rather than a phenomenon *per se*, is instead, referenced as such through specific citational material-discursive practices and produced by these. Crucially, as I will explain, this applies not only to how lay people produce leadership, but applies equally to what researchers do. I argue that it is through these citational practices, which, crucially, mobilise one or more of the five dimensions of leadership as depicted in figure 2.4 on page 32, that the phenomenon of leadership is materialised in practice.

The theoretical model I present here builds first on Ladkin's ontological question of 'What kind of phenomenon is leadership?' (2010, p. 3). Secondly, it draws on the following central concepts from Barad's agential realism, which I discussed in section 2.3.7.2: a) indeterminacy, b) material-discursive practice, and c) agential cuts as an intra-active site for the possibility of materialisation.

My argument to support this theoretical position is developed in the following manner: I start by arguing that in order to understand leadership as a phenomenon, a good place to start is at the level of practice, wherein such practices must always be *enacted*. I argue that many such enactments always already contain many of the features that are customarily associated with leadership, such as giving direction or producing coordinated outcomes. However, not all such enactments become leadership. My central claim is that leadership as a phenomenon emerges from the everyday work that helps to make mundane enactments of practice extraordinary. Critical here to the concept of leadership is the expectation that what—or more often who—is viewed as 'extraordinary' will pave the way towards some indeterminate but desired future (Grint 2001, pp. 413-419). I

caution, however, that not everything goes when it comes to the production of leadership; while leadership is multiple, it is never a relativistic affair.

I therefore want to argue that leadership as a phenomenon emerges from enacted work that helps to make everyday material-discursive practices extraordinary. We can therefore analytically distinguish between two sets of practices: what is ordinarily enacted and what is enacted to make the ordinary extraordinary. Thus, I have already suggested, based on the work of Ladkin (2010, p. 3) that a more apt ontological starting point from which to understand leadership as a phenomenon is to turn towards the idea of practice (Nicolini 2012; Reckwitz 2002; Schatzki 2002) as an *enactment*. I have suggested this because such practices already contain the idea of ‘leading’ as something inseparable from the daily process of organising or establishing order. In other words, antecedent to ‘leadership’, there are always already practices. Such enactments were present in the material-discursive practices presented in all three empirical chapters. For example, in chapter 4 there is the enactment of pair programming. In chapter 5, there is the enactment of pair emailing. Meanwhile, in chapter 6 there is the enactment of conference calls. Here I make an analytical distinction in that while all practices are necessarily enactments, not all enactments are necessarily considered by members to be practices citationally mobilised with the dimensions of leadership as depicted in figure 2.4 on page 32.

Practices of entertainment, for example, may not be considered enactments of leadership. I doubt, for example, that leadership would be ascribed to someone on the basis of watching a movie. But I also want to be careful here not to set hard and fast rules, but rather, to observe how people construct them *in situ* (Szymanski and Whalen 2011a, p. 6). Thus, despite it being entertainment, people often dance as partners, where there exists phenomena people refer to as ‘leading’ and ‘following’. And yet, in more modern forms dancing, people dance with one another, but not in so structured a form, more on their own and to their own individual sense. In this latter case, we might say someone is a great dancer, but we would not say that they are great leaders. And so, I want to caution that what I am presenting here is not a fixed set of rules by which leadership is instrumentally produced, but rather a model to aid in the understanding of the general dynamics of its processual emergence as per Sandberg and Tsoukas’s *practical rationality* (2011, p. 353). This model of the proposed citational production of leadership is depicted as figure 7.1.

At a minimum, a model of the citational production of leadership involves two stages of material-discursive practice. The first stage, *enactment*, depicted on the left-hand side of figure 7.1, occurs when some material-discursive practice of ordering is performed, as found in the practice of pair programming described in chapter 4, pair emailing described in chapter 5, or in the enactment of conference calls as described in chapter 6. At this stage, there is an *enactment* the status of which is indeterminate as a leadership

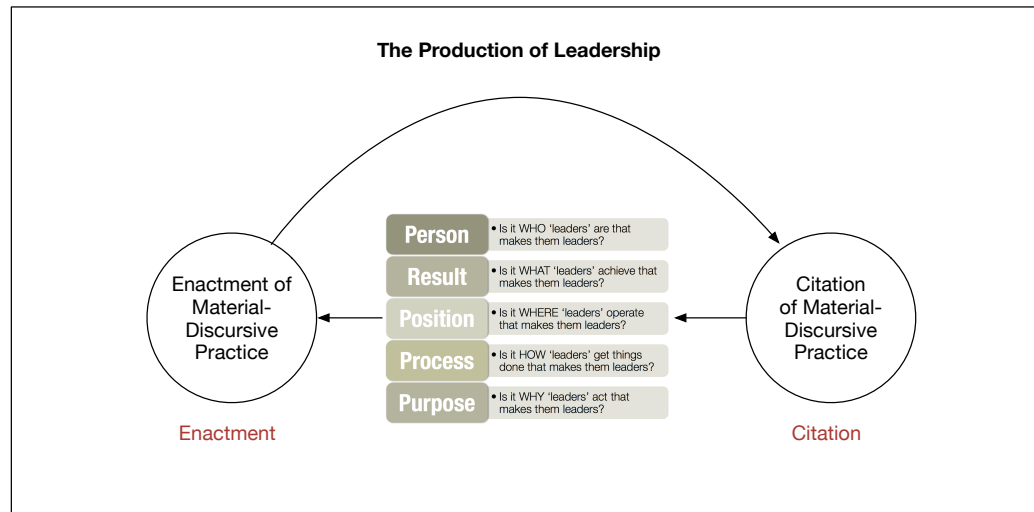


Figure 7.1: The Citational Production of Leadership

practice.

The second stage, *citation*, depicted on the right-hand side of figure 7.1, involves at least one, but possibly many more material-discursive practices. What distinguishes such citational practices is the referencing of (Latour 1999, p. 71) one or more of the five dimensions of leadership as depicted in figure 2.4 on page 32. These are indicated in figure 7.1 by the left-pointing arrows that move from *citation*, through the five dimensions of leadership and then point to an *enactment*. More specifically, the citational material-discursive practice can be applied towards *a*) the abstraction or general case of an enacted material-discursive practice, *b*) an enacted material-discursive practice that occurred in the past, *c*) within a material-discursive practice that is concurrent to/enfolded within the present enactment, or *d*) a material-discursive practice that is to be enacted at some future point.

In my theoretical model, *enactment* and *citation* thus operate performatively and processually. Specifically, once certain enactments of material-discursive practice are cited through one or more of the five dimensions of leadership, such citational practices lead to agential cuts (Barad 2003, p. 815) that include some possibilities while excluding others in their materialisation. The materialisation of leadership is denoted by the recursive arrow across the top in figure 7.1 where the linkage between the *citation*, one or more of the five dimensions, and the *enactment* is complete.² Thus, an *enactment*, plus a *citation*

²This occurs alongside the ever-present possibility of an alternate form of citational material-discursive practice not pictured in the figure, *contestation* (Barad 2003, p. 824), which can produce alternative agential cuts, dematerialising or changing the meaning of leadership or leadership practice. In this sense, a *contestation* is a special case of a citation that produces an alternative materialisation.

that mobilises one or more of five dimensions of leadership, all linked together through successive material-discursive practices, produces leadership.

To illustrate this, as shown in chapter 4 on page 121, within an internal discussion board system at *Eta*, an employee links specific historical practices of pair programming to leadership on the part of engineers as a management function. This is accomplished by claiming effective changes to business processes, binding this citation to the pair programming practice through the dimensions of *results* and *process* as depicted in figure 7.1. Elsewhere within the same discussion board system, the CEO writes about the general case of pair programming, citing all five dimensions of leadership as depicted in figure 7.1 to cite what makes *Eta*, in the view of its CEO, unique. Note also, that these are not mere discursive productions, as they are enacted *through* materialised entanglements with computational systems. Therefore, in order to encounter them, humans must enact specific material-discursive practices with their computational objects. According to my theory of citational production, as these discussion threads are composed, posted, stored, retrieved, rendered, read, and discussed (either within the discussion board system or in other forms of human communication) by other members within the site—and without the statements made therein ever being called into question or challenged—*lack of challenge* allows the citations to continue materialising leadership.

Put differently, when a material-discursive practice is not cited as leadership, its status as leadership is indeterminate. In such cases, the *enactment* goes unrecognised as leadership, or perhaps more accurately, does not *materialise*. For just as the enacted material-discursive practices involving computational objects are indeterminate with respect to leadership practice until they are cited *as* leadership, enactments that have already been materialised as leadership are simultaneously in a state where an indeterminate possibility for contestation and subsequent dematerialisation remains open. Ergo, absence of leadership holds the indeterminate possibility for its presence, while presence of leadership holds the indeterminate possibility for its absence or dematerialisation.

Hence, in chapter 5 when Sebastian tells his subordinate that Ruby is his ‘boss’ when it comes to scheduling another meeting with him, leadership is materialised citing ‘boss’ through an association of *position* as depicted in figure 7.1 with the future *enactment* of making an appointment to see him. Were Ruby to have responded with the contestation, ‘No, I am not’, Sebastian’s citation could have been called into question, and that moment of leadership may have been dematerialised. This is analogous to the example I provided in section 2.2.9 of Steve Jobs being cited by the *Harvard Business Review* as the world’s top CEO, as well as the manner in which *Fast Company* cited *results* (as depicted in figure 7.1) accomplished by Cisco employees as a indicative of the leadership of its CEO. Such citations stand as materialised instances of leadership, but since all citations are always open

to contestation, they simultaneously exist in a state of materialised indeterminacy with the possibility that leadership could be foreclosed. This is evidenced in famous examples, such as that of Dominique Strauss-Kahn, former president of the International Monetary Fund, who resigned from this post after being accused of sexual assault. For example, in response to these events, *The Guardian* reported:

France may have a habit of turning a blind eye to its leaders' sexual indiscretions, but the IMF chief's arrest could end that (Willsher 2011).

Elsewhere, Xifra (2012) has explored in great depth how, in response to these allegations, Strauss-Kahn attempted to repair his image using particular rhetorical techniques, which in this study, would be labelled material-discursive practices. Interestingly, Xifra compares statements by Strauss-Kahn to those made by Bill Clinton some years before in relation to Clinton's affair with Monica Lewinsky. Whereas Clinton did not resign and proceedings to impeach him were acquitted (United States Senate 1999), and that his wife is, as of the writing of this dissertation, running for U.S. president, suggests that Clinton has benefited from an alternative materialisation of leadership. In contrast, Strauss-Kahn, is currently a defendant in a trial for being involved with a prostitution ring (Willsher 2013). It remains to be seen whether he too will be acquitted. In line with my findings regarding breakdowns in chapter 6, these divergent outcomes simply reaffirm that the agencies involved with materialising versions of leadership are not fully in the realm of intentional control, but rather, entangled with a broader set of posthuman agencies, including computational objects³. However, in all of these cases, the same citational mechanism I am describing here provides an explanation as to *how* leadership is produced—or not. This pervasive indeterminacy which acknowledges the limit of individual human agency as well as the ongoing nature of materialisation is noted by Salih when she says the following:

The effects of one's words are incalculable, since performatives and their significations do not begin or end (2007, p. 66).

Thus, I reiterate a crucial point made in section 2.3.7.2 by underscoring my assertion that agential cuts *cannot* be engineered. Instead, I find it helpful to think of the agential cut as what Dirac refers to as 'a choice on the part of nature' (Dirac quoted in Stapp 2012, p. 603) to the possibilities for outcome arising from a particular material-discursive arrangement. According to Stapp, von Neumann in his interpretation of quantum mechanics, pushes the cut 'all the way up' (*ibid.*, p. 602) so that the 'observed' system contains all

³See section 2.3.5 for an elaboration of a posthuman perspective.

things that, according to classical ideas, are physical things, including the physical bodies and brains of all observers. These ‘physical’ things are all described in quantum mechanical terms. The classically described features of our perceptions become, then, aspects of an observing mental side of reality (Stapp 2012, p. 602).

In my reading, this perspective is crucial to understanding the agential cut; according to this view, our ‘minds’ are part and parcel of what is ‘cut’. We are not ‘outside’ anything. We are at the effect of the cut, and it is the universe that does the cutting, although we, like any other apparatus, have an impact on how the cut is made. But to come at the cut ‘as if’ we could ‘control’ it, is in my view, a misunderstanding of the whole point of how ‘determinate’ state comes to be. To take an example here, we enter into an ‘experiment’ to see if members accept whether what a computational object is doing is ‘leadership’; we may convince the members, but we may not convince our peers. The cut, in this case lies in the (re)configuration of the boundary between ‘peers’ and ‘informants’, but any attempt to intentionally position the boundary will always include a broader set of material-discursive agencies rather than a set of human intentions and, as such, cannot be determined in advance.

Thus, agential cuts are enacted through apparatuses that extend well beyond the intentionality of the human, and are entangled in a complex set of intra-actions that cannot be accounted for by human actions or intentions alone. Yet, when leadership *does* materialise, it does so, I argue, through the citational model of material-discursive practice that I have described.

Indeed, as I indicated in the previous finding, one can locate additional evidence to support the citational production of leadership by reviewing how other leadership scholars report the phenomenon in their research. Here I present examples from qualitative, critical, and quantitative streams of the leadership literature. First, Larsson and Lundholm tell us that:

Our analysis of a short interactional sequence shows that interpersonal influence and something that reasonably can be referred to as leadership, may be found in the midst of managerial work, in the highly routinized environment that the bank represents (2010, p. 175).

Here, they have just completed the presentation of a transcript of what a manager said to a subordinate. In this case, this is the *enactment*. Their statement acts as the *citation*, mobilised as ‘interpersonal influence’, that is, along the dimension of *results* as depicted in figure 7.1. Thus, if the reader does not contest the citational material-discursive practice, according to my theory, the material-discursive practice materialised leadership is—for the time being—sustained. However, were the reader to write a paper critiquing

their interpretation, there is a complex apparatus that would need to be taken into account in this imaginary scenario that includes, for example, *a*) the reader's reaction to the paper and decision to write a critique; *b*) the production of the critical article, involving myriad engagements with various technologies, including computational objects; *c*) the choice of the journal to which the critical article is submitted, including the computational infrastructure allowing submission; *d*) the receiving editor making a choice over its suitability for reviewers and the review process, along with attendant human-computer-based intra-actions that may occur during any revision and resubmitting cycle(s); and *e*) the final decision of the editor to publish or not to publish the critical paper. If that paper is published and read by a number of people, some may side with the original author, while others may side with the critic. Thus, for those siding with the original author, leadership is still materialised, while for those siding with the critic, it has effectively been vanquished.

Second, the following from Alvesson and Svenningsson's can be taken as a citational contestation to dematerialise leadership. They tell us that:

[M]anagers in the studied organization—a very large and respected knowledge company—have rather vague and contradictory notions of leadership. They embrace notions of working with ideas and visions, but seem to manage to do so only in vague ways. It is difficult to see how the managers/leaders do something distinct or establish a clear asymmetrical relationship where the exercise of leadership makes managers more important than others (2003a, p. 379).

In this quote, Alvesson and Svenningsson refer to the abstracted *enactment* of people having 'vague and contradictory notions'. They then associate this with 'ideas and vision', that is, the leadership dimension of *process* as depicted in figure 7.1. However, instead of using these linkages to affirm and materialise leadership, they instead neutralise it with their citational contestation asserting that 'it is difficult see', where 'it' refers to 'the exercise of leadership'. Thus, if one agrees with Alvesson and Svenningsson, leadership has *not* happened, it has not materialised.

And finally, when looking at a quantitative study of leadership, it becomes clear that leadership is materialised in these studies in precisely the same fashion. Antonakis and House, for example, tell us that:

Effective leadership reflects actions influencing the transformation process and ensuring organizational adaptation; leaders must thus (a) facilitate group interaction and (b) accomplish task objectives (Antonakis and House 2014, p. 747).

For them, the *enactment* is abstracted as an action ‘influencing the transformation process’. The dimensions of leadership mobilised, both for point a and b are along the leadership dimension of *results* as depicted in figure 7.1. And finally, the *citation* that materialises leadership is located in the subject of the sentence ‘Effective leadership...’.

My point in presenting these three different cases is not to criticise what these scholars are doing. Rather, it is to underscore the point I made in section 2.3.7.2 on page 73 which asserted that we are not ‘outside’ of anything. There is no outside of any system to get to, be that ‘language’ or ‘life’. According to the theoretical perspective I have taken, for something to be materialised, it must be enacted. Thus, in chapter 5 when Sebastian tells his subordinate that Ruby is his ‘boss’ and no one counters this claim, I suggest that leadership is materialised. But this theoretical perspective has additional implications, one of which I have already mentioned. For as I have shown here, even the best leadership researchers across qualitative, critical, and quantitative approaches call on the same methods that lay people do to materialise leadership. They *cite* it into, or out of, existence along with the various material-discursive apparatuses that constitute those citations, be they internal company bulletin boards or peer-reviewed academic papers.

The theoretical model I propose here does not belittle these material-discursive practices, but rather in the ethnographic spirit, attempts to make them visible so that they can be better understood for what they are—*practices of constituting reality*. It is for these reasons that I suggest that leadership, following Ailon and Kunda, acts as a ‘symbolic resource’ (2003), standing for particular values within the context of a community, such as an organisation. Following this line of reasoning, I suggest that on inspection, ‘leadership’ always stands for something else for which the word ‘leadership’ acts as a proxy or container; citation alerts us to an underlying process of categorisation (Bowker and Star 1999; Zuckerman 1999) of value and worth (Boltanski and Thévenot 2006) embodied in the material-discursive practice of citation.

7.3 Implications

In the previous section, I presented the findings of the present study. Here, I discuss their implications, organised by finding.

7.3.1 Entanglement

I ended my previous discussion of the principal finding of the entanglement of computational objects with leadership practice by stating that a long and rich history of research explored analogous relationships between technology and work practices (cf. Yates 1993, 2008; Zuboff 1988). More recently, these have been referred to as ‘assemblages’ (Latour

1999, p. 40), ‘constitutive entanglements’ (Orlikowski 2007, p. 1439), ‘imbrications’ (Leonardi 2011), ‘material infrastructures’ (Nicolini, Mengis et al. 2011, p. 11), and ‘technological embeddedness’ (Volkoff et al. 2007). All of these build on an approach to social science that looks to materiality with a renewed vigour (cf. Carlile et al. 2013; Law and Mol 1995; Leonardi et al. 2012; Miller 2005). These approaches however, have not been mobilised within leadership studies to any meaningful extent. The present study attempts to break new ground in this direction by applying such an approach to the study of leadership.

Within the extant leadership literature, there are distributed (Denis, Langley and Sergi 2012; Harris 2008), relational (Cunliffe and Eriksen 2011; Uhl-Bien and Ospina 2012b), and phenomenological (Ladkin 2010) perspectives that go well beyond traditional approaches to studying leadership. All of these arise out of the most recent move in the arc of social theory, *unifying the subject and object*, as discussed in chapter 2, section 2.3.5. These approaches, while not strictly materialist, have nevertheless forged the way for a more recent stream of leadership studies that take practice as its unit of analysis. These studies go under the name leadership-as-practice (LAP) (Carroll et al. 2008; Crevani et al. 2010; Endrissat and Arx 2013). Within this stream of LAP studies begin to take materiality seriously by exploring materialised practices, the body, and artefacts (Mailhot et al. 2014; Pullen and Vachhani 2013) as a means to better understand leadership. This dissertation therefore makes a novel contribution to the study LAP by including computational objects as actants in the production of LAP, it extends the boundaries of this work in significant ways.

The approach I have taken here is built on a theoretical hybrid of actor-network theory (ANT) and agential realism, where the latter has a particularly radical respecification of matter such that matter is ‘*not a thing but a doing, a congealing of agency*’ (italics in original Barad 2007, p. 151).⁴ Notably, agential realism views all phenomena arising out of various entanglements; in other words, there is nothing that is not entangled.

With this focus on computational objects and the mobilisation of the agential realism perspective in particular, this dissertation also contributes to the current debates on sociomateriality (cf. Carlile et al. 2013; Cecez-Kecmanovic et al. 2014; Kallinikos, Nardi et al. 2012; Kautz and Jensen 2013; Leonardi et al. 2012; Mutch 2013; Orlikowski and Scott 2008; Scott and Orlikowski 2013) by showing the reframing benefits of agential realism as a theoretical perspective and, moreover, by demonstrating its theoretical purchase for the development of novel theory in leadership studies.

However, this approach and the attendant finding of entanglement between leadership practices and computational objects also has significant implications for the study of leadership, both theoretically and methodologically. If one takes the theory of agen-

⁴See chapter 2 on page 70 for an elaboration on Barad’s conception of matter.

tial realism seriously, it suggests that leadership, like all other phenomena, is produced by specific material-discursive practices. Therefore, to understand leadership, it becomes methodologically necessary to study how those practices are arranged and performed. Following this kind of approach therefore requires presence in the field and a willingness to go beyond what is readily observable for a human; that is, gaining visibility into computational systems and the various intra-actions between them and other humans.

Moreover, at a practical and policy level, the finding of entanglement suggests that leadership development programmes would benefit from supporting leaders in developing productive relationships with computational objects. Within this study, I demonstrated how the life experience of human leaders in modern organisational environments implies an intensive, entangled relationship with computational objects, whether taking the form of Sebastian's innovative 'pair emailing' or Marilyn's more restricted backstage (Goffman 1956, p. 69) checking of email described in chapter 5. For example, the development of leadership development modules that include the idea of the 'technological unconscious' (Clough 2000, p. 2) as a sensitising concept could be employed to raise awareness of technological 'blind spots'. This might include how computational objects produce various distancing effects (cf. Bligh and Riggio 2012a; Brown and Lightfoot 2002; Hinds and Kiesler 2002; Hooijberg et al. 2007; Weisband 2008), and could help leaders make more informed decisions about how to engage computational objects to achieve their leadership aims.

7.3.2 Disjunction

The finding of disjunction between authority and responsibility arose out of specific observations within this study. Specifically, computational objects were found to be routinely placed in positions of authority, however, humans in the study did not see their enactments in these roles as leadership. This reveals one of the significant ways leadership is changing as it becomes increasingly entangled with computational objects. Historically, within leadership theory, the exercise of authority has been tightly bound to responsibility (MacGregor quoted in Bennis 1959, p. 261).

What agential realism helps us to see here is that as the agential boundaries of what is possible have shifted, this has enabled humans to delegate authority to computational objects in a variety of ways, from managing groups of programmers as I presented in chapter 4, to autonomous killing machines, such as drones, deployed by nation-states (cf. Sharkey and Suchman 2013; Suchman 2013; Suchman and Weber 2014). In so doing, the possibility for delegating authority and decoupling it from responsibility has been exponentially expanded, opening an indeterminate field with respect to responsibility.

To explain this phenomena, this study has proposed a theory of *posthuman* leadership to account for enactments of computational objects that produce functionally equi-

valent engagements and results as recognised leadership practices, yet, are not recognised as leadership by group members.⁵ In other words, to the extent that humans overlook computational objects and their authoritative roles in leadership practices, there is a disjunction of responsibility from authority in such delegation.

My theory of *posthuman* leadership suggests that ‘leadership’, in its performative enactment, is now (re)configured to include computational objects in ways that distribute the enactment of leadership while simultaneously obscuring it. The theory accomplishes this by building on agential realist’s concepts of *indeterminacy*⁶ and *diffraction*⁷ to identify a critical difference: a disjuncture between authority and responsibility. Through the identification of this phenomenon, my *posthuman* theory of leadership provides a cogent explanation as to how various situations come about in our modern world, where people find themselves at the mercy of computational systems without ever realising it. This is amply evidenced by a wide range of large-scale computational system failures that include airline shutdowns (Nicas and Carey 2013) and major financial market instabilities (US Commodity Futures Trading Commission and US Securities & Exchange Commission 2010), each of which has been accompanied by significant material consequences.

Theoretically, an implication for this finding of disjuncture is that it was surfaced through the deployment of the agential realist concepts of *indeterminacy* and methodological *diffraction*. Agential realism thus brings attention to disjunctures and differences that are produced as various apparatuses are (re)configured. As practices and apparatuses evolve and change, I suggest that a valid and important line of research is to topographically explore the terrain as it changes in order to identify critical differences and disjunctures as they emerge. I would also add that the application of agential realism has brought to bear a novel and detailed theoretical perspective on leadership that includes the role of computational objects in leadership practices.

Another implication of this finding of disjuncture is at a policy level. It suggests that greater attention could be given to how responsibility should be addressed when computational objects do not perform as expected—*before* things go awry. Rather than waiting until after the fact and then trying to find out whose ‘fault’ it is, it may be more beneficial for society if organisations that deploy computational technologies in authoritative roles were to agree to certain responsibilities with respect to these delegations up front. This is already evidenced in limited cases with so-called ‘service-level agreements’ (Goo et al. 2009) that pre-establish certain responsibilities an organisation has to a customer under conditions of system failure, where a computational system is delegated an authoritative role in execution of those services. To date, such agreements have been mostly limited to

⁵See section 2.3.5 for an elaboration of a posthuman perspective.

⁶See chapter 2 on page 59 for details on the concept of indeterminacy within agential realism.

⁷See chapter 3 on page 82 for details on a diffractive approach within agential realism.

hardware and software companies; however, given the ubiquity of computational objects in the workplace, this finding of disjuncture along with ample evidence of widespread mishap suggests that it may be advantageous for governments to explore an option of expanding the role of such agreements to the regulation of airlines, stock exchanges, and other industries that rely heavily on computational objects in authoritative roles.

7.3.3 Citationality

The finding of citationality as a means of producing leadership has important implications. First, it expands beyond Butler and Derrida's discursive notions of citationality (1993 / Butler 2011, pp. xxi-xxiv; Derrida 1977, p. 18) by deploying an agential realist perspective which asserts that the discursive is always produced through material-discursive practice. Therefore, the finding of citationality is not merely a discursive act but rather one which necessarily entails material doings, often on the part of computational objects. Thus, when, at *Eta*, statements are made on a bulletin board system about leadership and its relation to pair programming, as described in chapter 4, these necessarily involve engagements with computational objects and a larger computational infrastructure as a mechanism of materialisation. For that matter, the same is true for the spoken word, as such utterances are materially produced by the body. The distinction here, however, has to do with what Benjamin discussed in his essay *Art in the Age of Mechanical Reproduction* (1936 / 1969), where the various types of mechanised and computerised media that inform human experience are increasingly pervasive and allow for increased rates of the reproduction or distributed materialisation of various phenomena that, according to my argument, include leadership.

While a number of scholars take a discursive approach to the study of leadership (Fairhurst and Connaughton 2014; Ford 2006), an implication for the approach this study has taken is that, like Sergi (2013) and Fairhurst (Fairhurst and Cooren 2009), it includes materiality as part of the conception of discourse and therefore looks to material-discursive practice as the empirical source for data that can then be analysed. The finding of citationality, therefore, has methodological implications for the study of leadership, placing the materialisation of the phenomenon at *site* (Schatzki 2002, p. xi), where materiality and meanings are (re)configured and co-constituted.

Further, if the citational model for the production of leadership I have proposed is accurate, a central implication is that it holds not only for practitioners, but for scholars as well. Thus, scholars, by studying and communicating their findings, also contribute to various materialisations of leadership. This is an unavoidable conclusion of the theory I have presented, however, rather than viewing this as a weakness, I suggest that it alerts us to the responsibility that accompanies the possibility for materialisation, both for

researchers and for practitioners.

This is why, in chapter 2, section 2.2.7 I discuss Kempster et al.'s (2011) points about *purpose* and MacIntyre's *internal goods* (2004, 2007). For not only are these, in Kempster et al.'s view, moral and ethical ideas, they are also central to leadership. This is also why, in chapter 3, section 3.2, I quote Barad's perspective on ethicality being part of the material fabric of the world (2007, p. 182). For Barad, responsibility and accountability are unavoidable, specifically because we find ourselves as materialised beings involved with materialisation ourselves. We may ignore this responsibility, but even that does not make it go away. Thus, the perspective of agential realism pushes the ideas of Kempster et al. even further, asserting that ethicality is not simply an aspect of leadership we need to consider, but an ever-present part of *timespacemattering*. Seen in this light, there is no escaping the responsibility of that which we are present to, which necessarily includes material-discursive practices of citational production. The finding of citationality therefore contains inescapable moral and ethical implications, suggesting that the way we respond and how we are held/hold ourselves accountable in practice makes important differences in how leadership materialises and its subsequent effects.

On this note of ethical responsibility towards what one is present to, I move on to a discussion of the limitations of this study as a means to surface the issues which necessarily situate and constrain any contributions this study may offer.

7.4 Limitations

All human endeavours, including the present research, are necessarily limited. Limitation, from an agential realism perspective, is the cost of materialisation and located in the agential cut,⁸ which 'produce[s] determinate boundaries' (*ibid.*, p. 148) where 'constitutive exclusions emerge' (*ibid.*, p. 158). In this sense, all materialisation is an ongoing trade-off of what will be kept and what will be left behind.

7.4.1 The Ethnographic Method

For this reason, in chapter 2, I previously asserted that the present study has been grounded in the position that all knowledges are situated and partial (Haraway 1988; Harding 1991) and, moreover, that they can only be understood through the social contexts in which they are mobilised. This is the same 'social context' Kunda refers to in his definition of ideology, a context whose 'grounds' legitimate the 'assertion' of 'bodies of knowledge' (1986, p. 54). Such a position reveals an 'ethnographic sensibility [...] in keeping with a

⁸For further details on the concept of agential cuts within agential realism, see chapter 2 on page 73.

hermeneutic-phenomenological stance' (Yanow, Ybema et al. 2012, p. 367), which is central to my theoretical orientation. My focus here is on delineating shortcomings of this position.

While the ethnographic approach brings one closer to the object of study, there are issues with employing the researcher as an instrument (Van Maanen 1988, p. 14) that, like all humans, can only 'see the world through the forms we construct to grasp it' (Taylor 1989, p. 472). For these reasons, I have attempted to look critically upon myself both reflexively and diffractively as an instrument of research, as a means to be more aware of my own blind spots.

Issues of accountability and self-representation are of significant import in an ethnographic approach (Gorli et al. 2015; Van Maanen 1995; Woolgar 1988), and I have therefore attempted in chapter 3, section 3.1.3.1 to offer some semblance of the ways in which my own background has influenced the various decisions made in this study and, as well, in the empirical chapters 4, 5, and 6 to describe my relationships and involvement with the field in a way that offers the reader a sense of my own presence in the research. The reader is left to decide whether the manner in which I have accounted for myself is adequate.

Following Czarniawska here, I do not claim that the methodology I have deployed is the 'right approach to field studies in modern societies, but I do claim to have joined the search for such approaches' (2007, p. 17) that, in my view, help to reveal what is often overlooked.

7.4.2 Validity

An ethnographic approach inherently relies upon the researcher's interpretation of the data. For this reason, I collected and analysed the data in a systematic fashion, as described in chapter 3, section 3.1.4, and took additional steps to ensure that the interpretations I drew were plausible. For example, I included, as part of such procedures, asking informants to clarify concepts that were unclear, sending them coded interviews and/or field notes for review and scheduling follow-up conversations, presenting findings to informants in meetings, and sending them pre-press versions of my research for their review and comments. While these cannot guarantee validity, it is my hope that by adhering to these practices, I have done justice to my informants and their computational objects.

Even by mobilising such material-discursive practices to improve validity, I cannot claim either a complete or objective presentation of the data. Other sufficient accounts were possible and the selection of particular cases remain the consequence of my own authorial judgement.

7.4.3 Access

Another set of limitations in the study relates to the method for site selection, which I described in chapter 3, section 3.1.3.1 and the subsequent access I was granted.

A limitation of my site selection approach is that the various sites studied within this research project were self-selecting. This willingness to allow a researcher to observe normally hidden details of their work may constitute a form of selection bias. In contrast to organisations where I conducted sensitising interviews and discussed the possibility for shadowing, there were cases where I was initially given a positive indication, but ultimately I was declined. As I was not able to gain the same level of access to these latter organisations, the findings in this study may not apply to them or to other organisations where no contact whatsoever was made.

With some companies, I was also required to sign a non-disclosure agreement as a pre-condition for access. This meant that, in some cases, there was data I had access to that I was unable to include in this study.

Moreover, through the access I was granted, irrespective of what I was allowed and not allowed, how this varied across sites, and how, even in cases where the broadest access was allowed, limits of all sorts were present. The idea therefore was not to see everything, but within the contexts I was given access to, to be faithful to an ethnographic sensibility and attend to the mundane, the overlooked, and the details of habituated practice (Alvesson and Sveningsson 2003b; Chia and MacKay 2007; Star 1999).

7.4.4 Generalisability

As a small, qualitative multi-site case study, one of the potential limitations that must be faced is the generalisability of the findings. Therefore, it is important to distinguish the kinds of generalisability this study may have achieved. Here Yin has observed that case studies:

[A]re generalizable to theoretical propositions and not to populations or universes (2003, p. 10).

Yin distinguishes between *analytic* and *statistical* generalization, where the former is associated with the development of theory, while the latter ‘enumerate[s] frequencies’ (*ibid.*). Thus, a limitation of this study is that it does not attempt any statistical generalisation but, instead, following the call of Sandberg and Tsoukas’s *practical rationality*, the dissertation has sought to develop open-ended theories ‘in the sense that they are open to further specification in particular cases’ (2011, p. 353). In this sense, it also aligns with Law’s notion of the distinction between ‘live’ and ‘dead’ theories I discussed in chapter 2 in section 2.3.7 which, I argue, give me license to theorise as I have.

As a study that has set out to interrogate the ‘unexplored area’ (Kahai 2012, p. 102) between leadership practices and computational objects, thereby ‘opening up the technology black box [...in order to] discover new insights into how the Digital Age is affecting leadership’ (*ibid.*), it falls into a category for which Eisenhardt recommends an iterative approach to theory induction based on the case study (1989, p. 532) and for which Lee suggests such studies provide an environment for ‘natural experiments’ which integrate ideographic and nomothetic approaches to the production of scientific knowledge (1989, p. 119).

7.5 Future Research

Despite these limitations, I believe that this exploratory study has broken new ground in its attempt to map the terrain of relations between leadership practices and computational objects. I therefore hope this research inspires others to take this research programme forward in a number of directions. I briefly outline some of the possibilities here.

The particular settings I selected for this study could be greatly expanded. Studies following this in other kinds of organisations would help to build a better map of the relationships that exist between leadership practices and computational objects. These could include government, non-profit, educational, and a wider range of corporate organisations. This work could also be expanded methodologically to include videos of engagements between people and computational objects, adding a more explicit ethnomethodological lens. Further, a focus on practices of strategy or innovation employing a similar approach could be fruitfully explored, as these are commonly enacted within computationally-centric environments.

It is also the case that certain phenomena have been documented by this study where experimental testing could be undertaken. For example, a future study could test under what cases a human and/or computational object is cited as a leader, comparing the two. An interesting question might be to understand under what conditions might a human cite leadership to a computational object.

My own interests lie in continuing a practice theory (PT)-based programme of research. However, my present goal is to move beyond the computational object in a way that is only alluded to in this dissertation, through a stronger focus on *information infrastructures* (cf. Aanestad et al. 2014; Henfridsson and Bygstad 2013; Monteiro et al. 2013). While my selection of computational objects has been pragmatic in that these objects present a natural materiality for the observation and analysis of relations between humans and their leadership practices, exploring the relation between leadership practice and information infrastructures offers other possibilities. This direction holds promise because

it shifts the focus of information systems (IS) research beyond single-system paradigms towards such possibilities as viewing infrastructures as complex apparatuses. Such an approach would present significant challenges over and above the present study, as more robust methods to ‘reach in’ and ‘see’ what happens within an infrastructure would be required. I am, however, intrigued with the possibilities that this focus may yield.

Finally, objects other than computational objects could be explored in terms of their relations with leadership practice and might include documents, furniture, or specific kinds of environments, such as board meetings or presentations, to explore the citational production of leadership. Indeed, work along these lines is already beginning to emerge (cf. Larsson and Lundholm 2010; Mailhot et al. 2014; Perillo 2008) out of the leadership-as-practice (LAP) stream, and my hope is that work in this direction will continue to mount.

7.6 Contributions

The study has addressed an uncharted territory: the relationship between computational objects and leadership practices (Avolio, Walumbwa et al. 2009, pp. 440-441). By adopting well-established HCI and IS perspectives that assert a co-constitutive relationship between technology and practice (Orlikowski 2000; Suchman 1987), I have developed a rich understanding of everyday leadership practices and the roles computational objects play in their enactments. Additionally, through an interrogation of the material-discursive practice (Barad 2007, p. 178) between leadership practices and computational objects, I have developed new understandings. I summarise the proposed contributions this study offers for the consideration of the reader:

Subject Matter In conducting a study that explores the relationship between leadership practices and computational objects, I have contributed to the leadership literature an exploratory map of this terrain by undertaking one of the first systematic studies conceptualising and explaining the roles of computational objects in leadership practice.

Theoretical I have drawn my theoretical lenses from an analysis of the arc of social theory and shown that there is an important relationship between the development of social theory and leadership theory. Moreover, based on the most recent move in social theory, I have adopted a hybrid actor-network theory (ANT) and an agential realist theoretical lens that has helped take into account processual, posthuman, and material aspects of the phenomena under study. Together, with this parallel focus on computational objects and the mobilisation of the agential realism perspective, this dissertation also contributes to the current debates on sociomateriality (cf. Carlile

et al. 2013; Cecez-Kecmanovic et al. 2014; Kallinikos, Nardi et al. 2012; Kautz and Jensen 2013; Leonardi et al. 2012; Mutch 2013; Orlikowski and Scott 2008; Scott and Orlikowski 2013) by showing the reframing benefits of agential realism as a theoretical perspective and, moreover, by demonstrating its theoretical purchase for the development of novel theory in leadership studies.

Methodological I have departed from traditional approaches to studying leadership by leveraging a practice theory (PT)-based study of work to explore leadership, offering a rich and contextual account of the relationship between computational objects and leadership practices. Moreover, I have utilised a diffractive methodology that has combined a range of theoretical perspectives and viewed through one another in order to produce useful and novel perspectives.

Substantive The study has demonstrated how leadership practices are enacted with—and through—computational objects.

Bridging Multiple Literatures By taking this approach, the study contributes to the possibility of greater interdisciplinary dialogue among those who study practice, technology, and leadership.

The leadership-as-practice (LAP) Literature This dissertation makes a contribution to the study of LAP by including computational objects as actants in the production of leadership in practice. Where previous work in this stream has focused primarily on human practices rather than their relationship with artefacts, the present study extends the boundaries of this work in a posthuman direction, that is, a view that attempts to address the historic privileging of the human perspective by including perspectives which go beyond the human.⁹

Original Theoretical Contributions I have proposed in this dissertation three different original theoretical contributions to explain the phenomena of interest. The first is an analysis of the roles that computational objects play with respect to leadership practice. The second, *posthuman* leadership, highlights a disjunction between authority and responsibility. The third, a model of the citational production of leadership, offers an explanation as to how leadership is materialised in practice. Moreover, by combining and extending Grint (2005a, p. 18) and Kempster et al.'s (2011) fivefold model of leadership as depicted in figure 2.4 on page 32, I have highlighted particular material-discursive practices within the empirics that illustrate how both humans and computational objects can be mobilised as categories within the five dimensions

⁹See section 2.3.5 for an elaboration of a posthuman perspective.

of leadership: *person, result, position, process, and purpose*. I suggest that this synthesis of Grint and Kepmster et al.'s theoretical perspectives is also a contribution to the leadership literature through my proposals that their models be integrated and my proposed extension to their work.

7.7 Final Words

This study has demonstrated the entangled relationship between computational objects and leadership practices and offered a novel conceptualisation of the roles computational object play in these practices. It has also shown that as computational objects have been increasingly placed in authoritative roles, there emerges a disjunction of authority from responsibility in comparison to the delegation of humans. Thirdly, it has also presented an original theory explaining how leadership is produced. For each of these three findings, practical implications have also been discussed. I hope that these contributions will help to advance leadership theory and practice by bringing attention to the perennially overlooked aspect of technology in the study of leadership (Bass and Stogdill 1990b, p. xiii; Kahai 2012; Lowe and Gardner 2001, pp. 501-502). Further, I hope that this work helps to stimulate an increase in the cross-fertilisation between leadership studies, human-computer interaction (HCI), information systems (IS), and organisational studies (OS) where, I believe, much could be gained for the future of leadership through the collaboration of these disciplines.

Appendix A

Acronyms

ANT	actor-network theory
CEO	chief executive officer
CFO	chief financial officer
CMS	critical management studies
COO	chief operating officer
CTO	chief technology officer
EA	executive assistant
ECC	essentially contested concept
ESRC	UK Economic and Social Research Council
GB	gigabytes
GUI	graphical user interface
HCI	human-computer interaction
ICT	information and communication technology
IM	instant messaging
IS	information systems
JIT	just-in-time

LAP leadership-as-practice

MIT Massachusetts Institute of Technology

OS organisational studies

PT practice theory

SAP strategy-as-practice

SMTP Simple Mail Transport Protocol

STS science and technology studies

TCP/IP Internet Protocol suite

UI user interface

UPS uninterruptible power supply

WITS work item tracking system

XP extreme programming

YIM Yahoo™ Instant Messaging

Appendix B

List of Terms

actant I employ Latour’s definition: ‘The great interest of science studies is that it offers, through the study of laboratory practice, many cases of the emergence of an actor. Instead of starting with entities that are already components of the world, science studies focuses on the complex and controversial nature of what it is for an actor to come into existence. The key is to define the actor by what it does — its performances — under laboratory trials. Later its competence is deduced and made part of an institution. Since in English “actor” is often limited to humans, the word “actant”, borrowed from semiotics, is sometimes used to include nonhumans in the definition’ (1999, p. 303).

agential realism Agential realism is ‘an epistemological-ontological-ethical framework that provides an understanding of the role of human *and* nonhuman, material *and* discursive, and natural *and* cultural factors in scientific and other social-material practices, thereby moving such considerations beyond the well-worn debates that pit constructivism against realism, agency against structure, and idealism against materialism. Indeed, the new philosophical framework that I propose entails a re-thinking of fundamental concepts that support such binary thinking, including the notions of matter, discourse, causality, agency, power, identity, embodiment, objectivity, space, and time’ (italics in original, Barad 2007, p. 26).

computational object I employ the term *computational object* to highlight the materialised interfaces through which humans interact with broader computational systems. Computational objects are phenomenologically distinctive; through them humans experience and extend distributed computational platforms. They may be in the form of a personal computer, smart phone, tablet, or embedded within other objects, such as automobiles or conference rooms. They are also distinctive from other

forms of technology, such as airplanes or toasters, but share a material, physical, and embodied aspect through which humans interact with them. I employ this trope to simultaneously signal an emphasis on materiality, relationality, and a posthuman perspective that moves away from human exceptionalism.

discursive practice I derive this term from Foucault where he defines it as being associated with lived practices extending beyond the rational, forming a ‘body of anonymous, historical rules, always determined in the time and space that have defined a given period, and for a given social, economic, geographical, or linguistic area, the conditions of operation of the enunciative function’ (1969 / 2002, p. 117).

ideology My use of this term follows Kunda’s definition as ‘bodies of knowledge that must be understood in the context of the social arrangements within which they arise and which provide the grounds for their assertion’ (1986, p. 54).

leadership practice Within this study, leadership practices are those assemblages of material-discursive practices that are either cited as such by members, generally through the five dimensions of leadership as depicted in figure 2.4, page 32 and are so recognised, while also leaving open the possibility that uncited enactments may also be forms of leadership that go unrecognised by members.

material-discursive practice I employ this term with specific reference to the work of Barad, who describes such practices as ‘possibilities of change entailed in reconfiguring material-discursive apparatuses of bodily production, including the boundary articulations and exclusions that are marked by those practices in the enactment of a causal structure’ (2007, p. 178). My interpretation of this is that Barad asserts an ontological inseparability between meaning and matter, substance and significance, through the ‘material-discursive’ and their associated ‘apparatuses’ and/or ‘bodies’ enacted in practice.

pair programming Pair programming is an approach to writing software involving a dyad where ‘One of the programmers, the driver, has control of the keyboard/mouse and actively implements the program. The other programmer, the observer, continuously observes the work of the driver to identify tactical (syntactic, spelling, etc.) defects, and also thinks strategically about the direction of the work. On demand, the two programmers can brainstorm any challenging problem. Because the two programmers periodically switch roles, they work together as equals to develop software’ (Williams 2001, p. 27).

sceptical constructivism This theoretical approach addresses charges raised by critics of constructivism who claim that constructivists see all truth claims as equally valid. Sceptical constructivism avoids falling into a recursion of relativism by emphasising that ‘the constructivist does not assert that all claims have equal status; instead she asks which claims attract the most significant support and why’ (Grint and Woolgar 1997, p. 143). Thus, this approach to scientific enquiry seeks not to identify *truth* as such but instead to *understand* how that which is identified as truth comes to be.

source control system A source control system (SCS) is a software-based system, normally implemented through a database, that manages versions of files. Such systems are also referred to synonymously as ‘version control systems (VCS), source code manager (SCM), a revision control system (RCS), and several other permutations of the words “revision”, “version”, “code”, “content”, “control”, “management”, and “system”’ (Loeliger and McCullough 2012, p. 1). Entries to such a system are commonly referred to by users as ‘check-ins’. This family of computational systems enable a group of collaborative and often disparate users to ‘develop and maintain a repository of content, provide access to historical editions of each datum, and record all changes in a log’ (*ibid.*).

Weltanschauung German for *worldview*. The term is often employed to signal not only its definition, but also the history of its use in philosophical thought to ‘designate the inherently obscure source of all cultural life and thinking’ (Staiti 2013, p. 34) and an understanding of philosophy as ‘nothing but the conceptual articulation of pre-theoretical worldviews that are inextricably related to the historical, psychological, and cultural conditions of individual philosophers’ (*ibid.*).

Appendix C

Text of 2013 Apple Advertisement: 'Our Signature'

This is it.
This is what matters.
The experience of a product.
How it makes someone feel.
When you start by imagining
What that might be like,
You step back.
You think.

Who will this help?
Will it make life better?
Does this deserve to exist?
If you are busy making everything,
How can you perfect anything?

We don't believe in coincidence.
Or dumb luck.
There are a thousand 'no's'
For every 'yes.'
We spend a lot of time
On a few things.
Until every idea we touch
Enhances each life it touches.

We're engineers and artists.
Craftsmen and inventors.
We sign our work.
You may rarely look at it.
But you'll always feel it.
This is our signature.
And it means everything. (Apple Computer, Inc. [2013](#))

Appendix D

Shadowing Activities

Table D.1 enumerates the shadowing activities conducted within the scope of this research.

Date	Site	Informant	Title
07-Oct-2012	Eta	1018	Director
01-Nov-2012	Eta	1018	Director
08-Nov-2012	Omicron	1020	Principal
09-Nov-2012	Omicron	1020	Principal
10-Nov-2012	Omicron	1020	Principal
13-Nov-2012	Eta	1018	COO
13-Nov-2012	Eta	1018	COO
10-Jan-2013	Eta	1018	COO
17-Jan-2013	Eta	1018	COO
25-Mar-2013	Eta	1030	Programmer
26-Mar-2013	Eta	1030	Programmer
28-Mar-2013	Eta	1030	Programmer
03-May-2013	Eta	1019	COO
08-May-2013	Eta	1019	COO
08-May-2013	Eta	1036	Executive assistant (EA)
10-May-2013	Eta	1019	COO
14-May-2013	Delta	1032	Manager
15-May-2013	Eta	1019	COO
16-May-2013	Delta	1031	Programmer
20-May-2013	Delta	1031	Programmer
29-May-2013	Eta	1042	Director

Table continued on next page...

Date	Site	Informant	Title
30-May-2013	Delta	1033	Manager
08-Aug-2013	Eta	1018	Director
23-Sep-2013	Eta	1058	Programmer
18-Nov-2013	Delta	1006	Chief Scientist
20-Nov-2013	Delta	1033	Manager
21-Nov-2013	Eta	1037	EA
22-Nov-2013	Delta	1031	Programmer
25-Nov-2013	Eta	1019	COO
03-Dec-2013	Delta	1036	EA

Table D.1: Shadowing Activities

Appendix E

Interview Activities

Table E.1 enumerates the interview activities conducted within the scope of this research.

Date	Site	Informant	Title
18-Mar-2010	Epsilon	1059	CFO
18-Mar-2010	Epsilon	1060	Vice-President of Marketing
19-Mar-2010	Epsilon	1061	Vice-President of Operations
19-Mar-2010	Epsilon	1062	Vice-President of Sales
19-Mar-2010	Epsilon	1063	Vice-President of Product Development
19-Mar-2010	Epsilon	1064	Vice-President of Sales
18-Jul-2011	Theta	1000	Global Sr. Dir. of Engineer Education
25-Jan-2012	Alpha	1001	CEO
19-Mar-2012	Gamma	1002	Vice-President, Human Resources
19-Mar-2012	Gamma	1003	Sr. Dir., IT Talent & Career Development
28-Mar-2012	Delta	1004	Director, Platform Program Management
31-Mar-2012	Epsilon	1005	CEO
06-Apr-2012	Theta	1009	Director, Product Management
09-Apr-2012	Iota	1010	Sr. Vice-President and Corporate Officer
17-Apr-2012	Kappa	1011	Lieutenant Colonel
17-May-2012	Theta	1012	Sr. Program Mgr., Learning & Development
21-May-2012	Eta	1008	CEO
20-Jun-2012	Eta	1018	Director
25-Jun-2012	Eta	1019	COO
17-Jul-2012	Lambda	1013	CFO
11-Sep-2012	Zeta	1007	Chairman

Table continued on next page...

Date	Site	Informant	Title
25-Sep-2012	Delta	1006	Chief Scientist
17-Oct-2012	Nu	1016	Senior Director of Human Resources
26-Oct-2012	Beta	1022	CTO
09-Jan-2013	Rho	1027	Principal
18-Jan-2013	Sigma	1029	Change Manager
23-Jan-2013	Beta	1002	Vice-President, Human Resources
25-Jan-2013	Sigma	1029	Change Manager
25-Jan-2013	Nu	1024	Senior Engineer
28-Jan-2013	Eta	1019	COO
14-Feb-2013	Delta	1006	Chief Scientist
25-Feb-2013	Eta	1008	CEO
19-Mar-2013	Eta	1019	COO
03-Apr-2013	Phi	1040	Marketing Manager
05-Apr-2013	Chi	1041	Customer Success Manager
06-May-2013	Pi	1025	Partner
09-May-2013	Delta	1033	Manager
09-May-2013	Psi	1045	COO
14-May-2013	Delta	1032	Manager
15-May-2013	Eta	1050	CFO
15-May-2013	Eta	1026	Sr. Manager, Human Resources
17-May-2013	Eta	1042	Director
31-May-2013	Theta	1012	Sr. Program Mgr., Learning & Development
18-Jun-2013	Omega	1046	Founding Director
19-Aug-2013	Eta	1026	Sr. Manager, Human Resources
07-Oct-2013	Eta	1019	COO
28-Oct-2013	Phi	1067	Managing Director
01-Nov-2013	Eta	1042	Director
08-Nov-2013	Phi	1067	Managing Director
13-Nov-2013	Eta	1008	CEO
15-Nov-2013	Eta	1042	Director
21-Nov-2013	Eta	1037	Executive assistant (EA)
03-Dec-2013	Eta	1036	EA
17-Dec-2013	Delta	1043	Site Reliability Systems Engineer
18-Dec-2013	Delta	1032	Manager

Table continued on next page...

Date	Site	Informant	Title
19-Dec-2013	Eta	1051	Office Administrator
07-Jan-2014	Eta	1008	CEO
07-Feb-2014	Eta	1018	Director
03-Mar-2014	Eta	1036	EA

Table E.1: Interview Activities

Appendix F

Data Policy

The data policy for this research project is based on the promise of anonymity to participants. This is something that I take very seriously, for without this protection, I cannot conduct research. Each participant is assigned a unique ID number. All transcript files and field notes are stored under the ID numbers rather than the name of the individual. However, in many cases, participants mention names of people and organisations that would later identify them. To further de-identify the data, all individual names, company names, project names, and client names are given pseudonyms or described generically. For example, a person named *Barton* may be referred to as *Lucas*, a company named *Coca-Cola* may be referred to as *Alpha*, a project called *El Capitan* may be designated *ABC* or as an *engineering project*, and a client named the *US Government* may be named *XYZ*. The general principle is that while the research strives to convey to its readers the lived experiences of the people it depicts, they are written about in a way that protects their identity.

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