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RESEARCHING A POSTHUMAN WORLD

Interviews with Digital Objects

Catherine Adams and Terrie Lynn Thompson

Researching a Posthuman World

‘Adams and Thompson bring us face to face with the riddle of the Digital, and the puzzling significance of the Posthuman. I warmly recommend this phenomenologically engaging text to anyone who wants to understand the wondrous world in which we live.’
– Max van Manen, *University of Alberta, Canada*

‘Adams’ and Thompson’s heuristics will enliven fields of inquiry and produce research buzzing with agency, in which humans are no longer the only ones that speak. I hope the potential of this timely text will find its way to research practices across disciplines.’
– Lucas Introna, *University of Lancaster, UK*

‘This concise and highly readable text is a welcome contribution to the project of posthumanism and building research practices aligned with contemporary cultural theory.’
– Sian Bayne, *University of Edinburgh, UK*

Catherine Adams • Terrie Lynn Thompson

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Interviews with Digital Objects

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To things

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CHAPTER 1

Introduction to Posthuman Inquiry

Abstract We reflect on the many digital and nondigital things that support and shepherd today's professional practices. Things are not inert objects, but vital entities implicated in the co-constitution and becoming of our everyday worlds. We forward posthumanism as a theoretical framework to address our twenty-first century situation. Actor-Network Theory, phenomenology, and related methodological approaches used throughout the book are presented. Differences between objects and things are considered. We propose interviewing objects as a way to give things a voice in research, and thus include them as participants in inquiry. Eight heuristics are introduced for conducting posthuman research.

Keywords ANT · heuristics · interviewing objects · posthumanism · phenomenology

Introduction

The digital is everywhere. In pockets and purses, on desktops and bedside tables; computing technologies also compose much of the invisible infrastructure underwriting our twenty-first century lives. Microsensors track and digitize human activities, algorithms manipulate the data generated, then feed us steady streams of information about ourselves and the world around us. Headlines wrestle with big data, massive open online courses, datafication, and quantified selves; bots, robots, and self-driving cars; augmented and

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virtual realities; viruses, worms, and cybersecurity; wearable technologies, ambient intelligence, and the Internet of Things. Ethical questions and social concerns abound—from internet addiction and cyber-bullying to identity theft and the digital divide.

This book is about the digital and making its effects and affects *visible*. Our aim is to provide researchers and other professionals with an approach for including digital technologies in their research inquiries, and thus make them available for critical reflection and ethical consideration. To accomplish this task, we begin by forging a new and more inclusive understanding of what it means to be human in an increasingly technologized and networked world. Our intimate and often ubiquitous relationships with all things—including the digital—must be reckoned with, human and nonhuman agency needs to be reconsidered, and the presumed neutrality of technologies in human affairs questioned.

We open this chapter by suggesting that posthumanism—a theoretical perspective that aims to address our co-constitutive entanglements with nonhuman entities—may offer a productive way to rethink digital technologies and their manifold involvements in our personal and professional lives. Posthumanism asks us to attend to and take seriously that which is most near to us, the everyday things of our world. Since the publication of Donna Haraway's *Manifesto for Cyborgs* (1985), posthumanist scholarship has been issuing fundamental challenges to how we envision the human subject and its relational surround (Badminton 2000; Braidotti 2013; Barad 2003; Graham 2002; Hayles 1999; Wolfe 2010). Posthumanism is not about relinquishing our humanity and letting machines take over. Rather, it seeks to correct some of the anthropocentric biases that have dogged humanist perspectives. One such bias is the belief that we are autonomous beings who are unambiguously separated from our tools, or even our earthly surround.

We then introduce the two main methodological approaches referred to throughout this text, both of which align with posthumanist principles. The first is a sociomaterial perspective that draws on Actor-Network Theory (ANT), Science, Technology, and Society (STS) studies, and anthropologist Tim Ingold's (2000, 2012) more-than-human discernments. The second is founded in the practical phenomenology of Max van Manen (1997, 2014) and gathers insight from philosophy of technology, postphenomenology, media ecology, and critical media studies. In advancing these two approaches, we briefly address some of the methodological and philosophical overlaps as well as the unresolvable tensions between them. In the

process, we uncover some of the strengths and weaknesses that each brings to exploring and describing our digital and thingly involvements.

We invite human and social science researchers to explore a different approach to inquiry. We call this posthuman way of researching, *interviewing objects*. Object interviews explicitly include *nonhuman* things as important participants at a research site. Via a set of eight possible heuristics, we suggest that not only subjects but also objects may be interviewed, given a voice, and thus make them available for critical analysis. Interviewing objects is a way of speaking with things. Although our primary interest is supporting the work of posthuman researchers and their practices, we suggest that our eight object interview heuristics may also provide readers with a fruitful way to query the diverse range of digital (and nondigital) objects found in the midst of their professional and personal lives. In this way, it may be possible to make more ethical and responsive choices regarding the use of specific technologies.

What we are proposing is not always an easy shift in thinking. Interviewing *nonhuman objects* demands significantly different ontological assumptions and epistemological understandings than interviewing *human subjects*. Unfortunately, little guidance has been offered so far on how researchers might translate the insights of posthumanism into tangible, theoretically sound research practices. In our own research and teaching, we have found that interviewing objects provides an excellent way for researchers and professional practitioners to explore posthuman ideas and to gain insight into the otherwise hidden effects of the digital in their own and others' lives. We encourage readers to try out these heuristics in their everyday practices—whether at work, at home or in the midst of a research project.

Theoretical Framings

The Posthuman

What does it mean to be—or to become—posthuman? For some, the term evokes futuristic images of cyborgs like Captain Picard as "Locutus of Borg" in *Star Trek: The Next Generation*, an organic-inorganic collective of human and machine. For others, the posthuman is found in Neo of *The Matrix*, wired directly to the hallucinations of virtual reality, and oblivious to his bleak real-world situation (Herbrechter 2006). For others still, posthumanity is made visible in the prosthetic art of Stelarc and his human-computer interface experiments that breach and complicate our fleshy

boundaries, portending weird hybrid humans, or even the obsolescence of the human body.

Such fantastic images and speculative portrayals also raise some of the key questions that posthumanism poses. The dystopian television series *Black Mirror*, for example, confronts us with possible futures where some of our society's most cherished binaries, like the separation between public and private life, have been undone by digital technologies. Recent films such as *Ex Machina* (2015), or even classics like *Blade Runner* (1982), similarly ask us to question our most closely held understandings of what we mean by human. Who is more human—Rachael the bioengineered android or Deckard the human replicant assassin? What happens when a machine is made of flesh and blood? Can a machine be more human than a human? How will we tell the difference? Lines blur. Separations that we have taken for granted unexpectedly dissolve and form uncanny "inhuman" hybrids. In such moments, our either/or, binary thinking is dealt a blow and slinks away or, dazed, tries to reassert itself in the face of unanswerable questions.

The posthuman does not mean that we are no longer human, that we are becoming inhuman, or even that we are destined to cast off our flesh and blood bodies (Hayles 1999). Rather posthumanism is about revisioning the human *beyond* some of the anthropocentric constraints of humanism, and about questioning and transgressing some of our most prized dichotomies of thought: subject and object, public and private, active and passive, human and machine.

> A posthumanist account calls into question the givenness of the differential categories of "human" and "nonhuman," examining the practices through which these differential boundaries are stabilized and destabilized. (Barad 2003, p. 808)

Posthumanism attempts to stand outside of or arrive before such binaries and strives to discover ways to "talk . . . about the social-and-the-technical, all in one breath" (Law 1991, p. 8). This is necessary because, as Nigel Thrift (2005) declares, "what is inside is also outside." Today we find ourselves on the cusp of a new understanding that has been provoked by "the changing nature of materiality [and] new infrastructures which question our usual concept of mediation" (p. 231). Provoked by ecological crises and early feminist studies, posthumanism found a sure footing in the digital. The digital is encroaching on and penetrating our flesh, infecting all aspects of our lifeworlds, and has thus inaugurated persistent questions

about our relationship to nonhumans and the "more-than-human" world (Abram 1996, p. 7).

Posthumanism involves reconceiving who we are as human beings in relation to the other-than-human world that we inhabit. Because of continuously fluctuating and unstable boundaries between ourselves and our material surroundings, posthumanists prefer to talk about "human becoming" rather than "human being." Too, posthumanism comes in multiple flavors and emphases (Roden 2015). For example, Jane Bennett's (2015) vital materialism "attempts to depict a world populated not by active subjects and passive objects but by lively and essentially interactive materials, by bodies human and nonhuman" (p. 254). Others have announced the imminent death of the posthuman. Claire Colebrook (2014), for example, situates the posthuman as a necessarily provisional theoretical figure who tells us less about life in the future and more about its extinction in the Anthropocene.

Central to the posthuman thesis is that we humans are and always have been hybrid or heterogeneous creatures:

> Humans have always lived in a hybrid environment surrounded by artificial and natural objects. The artificial and the natural are not separate realms, nor are artificial objects simply instruments with which to conquer the natural; instead they constitute a dynamic system that conditions human experience and existence. And precisely because the artificial is constantly developing toward greater concretization, it demands constant reflection on its singular historical condition. (Hui 2016, p. 1)

Our evolution is supported by, and is contiguous with, the development and use of our technologies and built environments. Posthumanism addresses our intimate and co-constitutive entanglements with our technologies as well with the natural, pre-given world and its creatures. Crucial for our purposes, it asks us to attend to the everyday things of our world in a new way.

Posthumanism involves an emphatic turn towards nonhumans:

> Humans do not exist alone . . . they exist in a world, one replete with things. To transform the human through a thought of being-in-the-world is to likewise transform the world, and so long as the hard, philosophical work of transforming the conception of the thing in that world remains outstanding, nothing changes at all. To change the "subject" while retaining the "object" is to change nothing. (Mitchell 2015, p. 12)

The turn to nonhumans contaminates the "ontological hygiene" (Graham 2002, p. 33) of the autonomous human subject, exposing its skin to the invasive imperatives and corrosive cohortations of its material surround. Latour (1993) suggests that modernity has successfully maintained the sovereign status of the human by using two epistemological strategies: purification (separating all things into taxonomies, binaries, and categories) and translation (manufacturing hybrid beings from the divided categories). Binary pairings, when placed together, compose a restorative whole, but in doing so they remain complicit in maintaining pure boundaries. Posthumanism asks: What is transpiring in the human-nonhuman relational hyphen? And what are the hybrid creatures and cyborg figures created in these diffracted melds?

A new epistemology like posthumanism demands new methods: *Thinking* in a new way is closely tied to *doing* (and ultimately *being*) in a new way. To this end, we introduce a set of eight heuristics to assist researchers and practitioners mobilize posthuman insights through making the digital and its objects available for critical interrogation. We call this mode of inquiry "interviewing objects." Our eight object interview heuristics, enriched with empirical examples, are the main methodological contribution of this book. Each heuristic provides the reader with a way of "speaking with things," that is, of making visible and questioning relevant digital objects found at one's research site, but too, in one's personal and professional lifeworlds. Although we will primarily be addressing digital things in this book, our object interrogation strategies are also applicable to other nonhuman entities.

Over the past few decades, other approaches and adaptations to doing human and social science research have been developed in response to the digital. For example, there is a well-established body of scholarship on digital ethnography and its close cousins cyber-ethnography, networked ethnography, and open ethnography. In *Digital Ethnography: Principles and Practice*, Sarah Pink et al. (2016) draw on seven key concepts from social and cultural theory—experience, practice, relationships, things, localities, social worlds, and events—to offer a range of "different routes to approaching the social world" (p. 14). They suggest that the digital is not an add-on or simple translation of existing face-to-face practices, but rather it has opened new research sites and inaugurated new analytic and dissemination processes. In *Digital Sociology*, Deborah Lupton (2015) proposes a fourfold typology that depicts digital sociology as professional digital practice (how researchers use digital tools to network, discuss,

share, and instruct); analyses of digital technology use (researching how people are using digital technologies); digital data analysis (using "naturally occurring" digital data for qualitative or quantitative research); and critical digital sociology (reflexive analysis of digital technologies in use) (p. 15). These are only two examples in a growing body of literature on new digital research methods. Each forwards a different way to think about and approach the digital and its effects.

What distinguishes our approach from other "digital" and "cyber" methodologies are: (1) our explicit attention to posthumanism and its implications and (2) our ongoing interest in providing both researchers and practitioners alike with critical, theoretically informed, yet eminently practical ways to reckon with the digital. Below, we introduce the two main methodological frameworks that give rise to our object interview heuristics: ANT and phenomenology. Both are posthuman-friendly. Both strive in different ways to overcome subject/object dichotomies and "the binary of stale choices between determinism and free will, past, and future" (Barad 2010, p. 254).

ANT and Beyond

ANT is part of what has been called the *sociomaterial turn*. Sociomaterial perspectives challenge the often taken-for-granted division between humans and the material things of our world and instead focus on the co-constitutive nature of practices. Tara Fenwick (2014a) states:

> Instead of examining only human actors, their individual skills and their social inter-relationships, a sociomaterial view treats the social and material elements of knowledge practices as entangled and mutually constitutive. Materiality is particularly highlighted, revealing ways that bodies, substances, settings and objects combine to actually embed and mobilise knowledge, materialise learning and exert political capacity. (p. 265)

ANT is one theoretical perspective that supports researchers and inquirers in untangling the mix of human and nonhuman actors implicated in what we do and what gets done. Most people tend to ignore, dismiss, or subordinate the materials—the things—that populate the backgrounds and foregrounds of work and learning practices. ANT acknowledges the force of things, recognizing that the work that goes on in our world is performed through human-nonhuman partnerships.

Things are actors, actors that network and so connect up with other things as well as individuals.

Emerging from the field of STS, with roots in post-structuralism and ethnomethodology, ANT originates from the work of Bruno Latour and Michel Callon in the late 1970s and early 1980s. It has evolved as different thinkers have drawn on it to engage a range of different research questions. ANT (and after-ANT) and its sociomaterial "cousins" such as complexity theory, materialist feminisms, new geographies, and other material orientations have a distinctive relational ontology. The strengths of ANT are the unique conceptual entry points it creates for more critical questioning of practices. Highlighted here are four key tenets of ANT. These and others will be further developed throughout the book: (1) the legitimacy of nonhuman actors, (2) the prominence of networks and assemblages, (3) the endless work of translation, and (4) the politics of object assemblages. Helpful texts for those making a foray into ANT include Fenwick and Edwards (2010) and a short introductory piece by Thompson (2015a).

As outlined above, ANT creates an opening for regarding objects as legitimate actors. Starting from the "uncertainties and controversies about who and what is acting when 'we' act" (Latour 2005, p. 45) creates expansive openings for exploring work-learning practices. Second, ANT posits that elements achieve their form and character only in relation to the others (Law 2008). ANT is interested in the connections, proximities, and juxtapositions of actors within a practice and how such relations come to be. Each actor is a network, hence the hyphenated phrase "actor-network." The focus is on what ANT theorists call *assemblages*—conglomerations of actors—and on how any practice emerges as an effect of such assemblages.

Third, translation is a powerful ANT concept that enables researchers to look at how assemblages come to be and how actors interface with others: willingly, under coercion, or unknowingly. It is through translations that entities meet up and interact with others, transform, become linked or decoupled. ANT asks: How has this collection of actors come to be assembled? Or disassembled? Or reassembled differently? Fourth, ANT "maps the relations of practice" (Law & Singleton 2012, p. 7). Emphasizing more critical understandings of the relationship between people and the everyday things in work-learning practices enables researchers, practitioners, and policy-makers to engage with notions of power and legitimacy, otherness and difference, morality and multiplicity. ANT dives headfirst into debates about the politics of things.

Closely related to both ANT and phenomenology is Ingold's work in anthropology. Ingold (2012b) argues for less focus on the "objectness" of things and more attention to the "material flows and formative processes wherein they come into being" (p. 431). He explains that practitioners do not merely interact with their materials but rather co-respond with them. He (2012a) employs the term *meshwork*—"an entanglement of interwoven lines"—rather than *network* to emphasize their living vitality (p. 49). Anusas and Ingold (2013) suggest moving beyond "the networked assembly of discrete objects" and instead consider the "entangled mesh of materials in energetic movements, out of which the forms of things are continually emerging" (p. 66). Ingold's work appears in several of the heuristics we present later in the book.

Phenomenology and Its Kin

Phenomenology is a school of philosophical thought that originated with the groundbreaking work of Edmund Husserl. His clarion call to "return to the things themselves" (*zu den Sachen selbst*) encapsulates phenomenology's aim to revive living contact with the everyday world and to attend to concrete, prereflective human experiences in all its variegated richness. As a philosophical movement, it continues to evolve. Phenomenology is marked by its radical openness to the world, as it aims to reflect on prereflective experience, that is, the lifeworld as we experience it in the lived now. As such, phenomenology relentlessly resists theory, and instead "attempts to match reflection to the unreflective life of consciousness" (Merleau-Ponty 2012, p. xxx). Its methods assist the phenomenologist to push away theoretical preconceptions and other preunderstandings that may prevent the things of the world to "speak for themselves."

Phenomenology is also one of multiple forms of qualitative inquiry for doing human science research. For a brief introduction to phenomenology as a research methodology, see Adams and van Manen (2008) or van Manen and Adams (2010). In this book, we draw extensively on van Manen's (2014) "phenomenology of practice." Phenomenology of practice employs multiple methods derived from qualitative human science research (e.g., interviews and observations) as well as philosophical phenomenology (e.g., the various forms of the epoché and the reduction).

From a posthuman perspective, phenomenology strives to overcome binary thinking through describing "person-world intimacy in a way that legitimately escapes any subject-object dichotomy" (Seamon 2002, para. 26).

Our everyday prereflective, preobjective, presubjective relationship with the world is captured by the phenomenological notion of "intentionality," and too, by Heidegger's (1962) *Dasein* ("there-being" or "Being-in-the-World"); the latter term clarifies that we humans are ontologically inseparable from our "there" or our immediate surroundings. We are, as Heidegger (1971) put it, "the be-thinged, the conditioned ones" (pp. 178–179), who are always already existentially entwined and hermeneutically engaged with the things of our world. Phenomenological speaking:

> In the normal course of our daily lives, things are not indifferently "out there in the universe," located within some neutral coordinates of space and time. Rather they are *meaningfully* present to us. They do not just exist; they make sense, and the sense they make is their "being." (Sheehan 2014, p. 111, italics in original)

As such, our primordial involvements with things and the material conditions of our lifeworld figure prominently in phenomenological description and reflection: "For *Dasein* there is no outside, which is why it is also nonsensical to talk about an inside" (Heidegger in Carmen 2003, p. 128).

Philosophy of technology draws heavily on phenomenology's insights, especially Martin Heidegger's (1962) "ready-to-hand"/"present-at-hand" hammer analysis and his seminal Bremen lectures (2012) including *The Question Concerning Technology*. Contemporary phenomenological philosophers of technology include Sylvia Benso, Albert Borgmann, Hubert Dreyfus, Graham Harman (who, along with Peter-Paul Verbeek, has sustained an ongoing interest in ANT and the scholarship of Bruno Latour), Bernard Stiegler, and postphenomenologist, Don Ihde. Postphenomenology, a hybrid of phenomenology, focuses on technology and the lifeworld, and draws on Heidegger, Maurice Merleau-Ponty, and others to trace the embodied, sensuous, and hermeneutic aspects of material objects in relation to human subjects. For Ihde (2003):

> What is different about [post]phenomenology, in a nuanced change from classical phenomenology, is the thematizing of materiality, particularly in the form of instruments and devices by which we make "worlds" available to us which were previously unexperienced and unperceived. Instruments are the means by which unspoken things "speak," and unseen things become "visible." (p. 20)

For example, Ihde (1990) identifies different focal and background human-technology relationships that mediate how the world is present to human beings. Some technological artifacts become quasi-transparent extensions of our bodies (embodiment relations), while others are encountered as a display of special signs to be interpreted (hermeneutic relations). Of particular interest to postphenomenology is how different technologies *incline* different practices (Aagaard 2015). Verbeek (2005) builds on the work of Ihde (as well as ecological psychologist J. J. Gibson) to show how objects invite or afford some actions and inhibit others via a prereflective grasp of their sensuous qualities.

Finally, some media ecologists (e.g., Marshall McLuhan) and media theorists (e.g., Mark B. Hansen) also share important philosophical overlaps with phenomenology. For example, McLuhan once described his *Laws of Media* (McLuhan & McLuhan 1988, p. 128) as a phenomenology of media (McLuhan et al. 1978, p. 94). Media ecology understands a medium as an environment—a unique, atmospheric background of effects—that a given technology convenes. Every medium, that is, every *lived* technology, is profoundly ecological: dilating and contracting, infecting and infusing human perception, action, and understanding, with potentially far reaching implications and reverberations in our personal, social, cultural, and political lives. Like Stiegler's (1998) theses of human technogenesis (our coevolution with our technologies) and epiphylogenesis (the ongoing exteriorization of our memories), media ecologists view the evolution of human being and becoming as inextricably intertwined with our technologies. As we take up, learn to use, and ultimately habituate to a new technology, it silently disperses and permeates our world.

Hansen (2006) similarly describes digital media as environments, "poised on the cusp between phenomenology and materiality" (p. 297). More recently, Hansen (2015) has suggested that twenty-first century media (e.g., big data generated via microsensors, etc.) represent a radical "shift from agent-centered perception to environmental sensibility" (p. 5), a situation that demands a new environmental understanding of agency:

> Human experience is currently undergoing a fundamental transformation caused by complex entanglement of humans within networks of media technologies that operate predominantly, if not almost entirely, outside the scope of human modes of awareness (consciousness, attention, sense perception, etc.) (p. 5)

In the throes of today's world-sensing or "vibratory" media, Hansen (2015) rejects media theorist's notion of the "interface" in favor of a phenomenology of implication. For him, the theoretical "figure of the interface only serves to reinforce long-standing divides—between subject and object, human and world" (pp. 256–257). Phenomenology's intersections with these and other posthuman media approaches to technology will be expanded in Chapters 2 and 3.

Phenomenology and ANT Together and Not

Phenomenology aims to describe our prereflective experiences—here, attuned to the nearby things and digital technologies intimately intertwined with and implicated in our everyday lives. Sociomaterial approaches like ANT amend this project, seeking to trace the relational ties and practices (re/dis)assembled as humans and technologies engage with each other. Between these two approaches, there exist some fundamental differences in the ways they attend to things and technologies. The focal concern of ANT is heterogeneous networks of people and things. For phenomenology it is the lived immediacy of the lifeworld. Each approach springs from divergent epistemological and philosophical roots. These differences in origin and focus are also evident in the subtle but nonetheless significant distinctions in vocabularies and methodological meanings: material semiotics vs. material hermeneutics, agency vs. intentionality, translate vs. condition, "follow the actors themselves" (Latour 2012, p. 12) vs. "return to the things themselves" (Husserl 1982, p. 252).

For some, ANT is irreconcilable with phenomenology. However, Arianne Conty (2013) points out that

> [s]ince Heidegger already understood *Dasein* in terms of co-dependent agencies, which themselves construct the "is-ness" of all entities, Latour can be understood as further developing Heidegger's method of phenomenological revealing, rather than proposing something radically different. (p. 313)

Conty blames ANT's occasionally strident objections to phenomenology on an unfortunate conflation of its current work with early Husserl and his internalist focus on transcendental consciousness. Today's phenomenologies, with few exceptions, have long since been revised to reflect Heidegger's existentialist insights regarding our co-constitutive

being-in-the-world. Conty (2013) points out that *both* Heidegger and Latour

> seek to overcome a subject/object divide that they both understand as characterising modernity in order to reveal a greater interdependence between nature and culture, human and machine. Not only do they both seek to deconstruct the subject/object divide that techno-science has imposed as a paradigm dictating how we as subjects understand the world, but they both use a similar strategy to do so, finding a better means of allowing phenomena to come to presence by turning to premodern culture, ancient Greece for Heidegger, "primitive," non-modern cultures for Bruno Latour. . . . Notwithstanding the fact that Heidegger's analysis [of technology] does indeed appear to be coloured by a nostalgic preciousness regarding crafted objects and Greek temples, there is . . . nothing ontologically different about their approaches to technology (pp. 311, 312)

Ihde (2012) similarly argues that Heidegger's oeuvre suffers from a nostalgic "blind[ness] to the differing contexts and multidimensionalities of technologies that a pragmatic-phenomenological account can better bring forth" (p. 115). Nonetheless, as Olsen (2010) points out, "there are some striking similarities between Latour's network approach and Heidegger's world of relations" (p. 73). Too, philosophers of technology have been scoping multiple intersections between these two modes of inquiry for more than a decade (Ihde 2015; Introna 2007; Verbeek 2005).

Both ANT and phenomenology recognize human-technology relations as co-constitutive—the things of our world constitute us as much as we constitute them. Both have a primary interest in *letting the things of the world speak for themselves* (Heidegger 1962). Within an ANT framing, subject/object separations are undermined through an ontological demotion of the human (subject) and the promotion of the nonhuman (object) by recognizing agency as distributed. With phenomenology, subject/object boundaries are rendered translucent in the immediacy of the prereflective lifeworld. Phenomenology is adept at discerning the *passivities* (the pathic dimensions or perceptual responsivities) of the everyday lifeworld; ANT excels at describing the web of *activities* that comprise work and learning practices. Practiced together, these two approaches embed and struggle with these two shifts in emphasis, creating active-passive imbroglios for analysis and reflection.

Both have been described as research sensibilities, privileging rich description over explanation and theory. Both reject the application of

some "all-purpose, all-terrain 'methodology'" (Latour 2005, p. 96n126), preferring instead a multilayered approach to be adapted in the field. Both employ inter-relational ontologies to account for our practical engagements with technologies. While both forms of inquiry attempt to do away with the subject/object dichotomy, Verbeek (2005, p. 166) explains that they do so in different ways. Latour (1993) denies that the gap exists and instead emphasizes hybrid or quasi-objects and quasi-subjects, while phenomenology tends to highlight the "mutual engagements that constitute subject and object" (Kaplan 2009, p. 233).

Philosopher Graham Harman (2009a) claims that "phenomenology harbors resources that lead it to converge with Latour's insights, however different their starting points may be" (p. 100). Both shy away from thinking about things as solid objects and instead regard them as "a system of things in reciprocal connection" (p. 143), aka the network and Heidegger's equipment. Finally, there is a growing body of scholarship that draws abundantly on the insights of both phenomenology and ANT, including nonrepresentational research, and the work of Ingold, Lucas Introna, and Verbeek. We see these two approaches as variously complementary, occasionally agonistic, but inevitably productive in uncovering our manifold personal and professional co-constitutive relationships with digital things.

Objects and Things, Materialities and Medialities

Throughout this book, we make liberal use of the terms "object" and "thing." We hesitate to draw a firm line between these two terms, in part to avoid deploying yet another binary in the discourse of materiality. At times, we use the two terms interchangeably. At other times, we try to be sensitive to how different scholars may employ these terms in radically different ways. For phenomenologists, for example, a "thing" gathers, abides, and "is nestled within a context" (Mitchell 2015, p. 13), whereas an "object" (*Gegenstand*) designates a thing encapsulated and momentarily stripped of its relational context:

> A thing is no simple presence, nothing that can be understood as an independent and relationless unit of objective presence. Things concern us and appeal to us, we care for them and live with them. We leave our marks upon them, even wear them out, and they leave their marks on us. They are nodes of a relation, not inert and dumb objects. (Mitchell 2015, p. 11)

Drawing on Heidegger and Flusser, Ingold (2012b) describes an object as that which literally stands against us or is thrown in our path. At best we may inter-act with it. "But if objects are against us, things are with us" (2012b, p. 436). We co-respond with things. A thing is

> a gathering of materials in movement—a particular knotting together of the matter-flow—and to witness a thing is to join with the processes of its ongoing formation. To touch it, or to observe it, is to bring the movements of our own being into close *correspondence* with those of its constituent materials. (Ingold 2012b, p. 436)

As Heidegger (1971) puts it simply: a things *things*. Ingold (2012b) adds that unlike "stopped-up objects," things *leak*:

> Things can exist and persist only because they *leak*: that is, because of the interchange of materials across the ever-emergent surfaces by which they differentiate themselves from the surrounding medium. The bodies of organisms and other things leak continually; indeed, their lives depend on it. (p. 438)

Latour (2005) offers a parallel delineation when he separates objects into "matters of fact" and "matters of concern," which he describes as a productive source of uncertainty. For the most part, however, sociomaterialists tend not to make such distinctions.

Although ANT is sometimes referred to an object-oriented perspective, ANT scholars tend to use several terms interchangeably to describe objects, including actors, entities and, of course, things. Of importance in sociomaterial analysis is the *assemblage*, the mishmash of human and nonhuman, animate and non-animate, actor and network. ANT defines a thing (or object) entirely by its relations (Harman 2009a). Because elements of an assemblage achieve their form and character in relation to the others (Law 2008), it is not surprising that attention is riveted to these gatherings of things and people. When considering individual elements, the focus is on the mobility and fluidity of these entities. Latour's immutable mobiles, John Law and Vicky Singleton's (2005) notion of fire objects, and what is made visible and invisible (or othered) in the network come to mind.

Current sociomaterial studies employs terms like "materialities," "materials," and "matter." Fenwick (2014b) explains:

> "Material" refers to all the everyday stuff of our lives that is both organic and inorganic, technological and natural: flesh and blood; forms and checklists;

> diagnostic machines and databases; furniture and passcodes; snowstorms and dead cell zones, and so forth. "Social" refers to symbols and meanings, desires and fears, and cultural discourses. Both material and social forces are mutually implicated in bringing forth everyday activities. (p. 47)

Materiality is also about the force of an assemblage, its movements, how it shape-shifts, and its ways of engaging and connecting. Materiality is of both stuff and action. In her book, *The Materiality of Learning*, Estrid Sorensen (2009), makes the following cut:

> I let material stand for an entity that has achieved a purified nonhuman character, and I let materiality refer to the achieved quality of a hybrid that allows it to relate to other parts. Thus, the notion of materiality applies to social as well as material parts. (p. 61)

Sørensen speculates that the term "material" will eventually become superfluous. But meanwhile, she is satisfied that the two terms—material and materiality—serve to draw sufficient attention to the "tangible, material things that surround us in learning and educational practices" and sensitize researchers to the construction of social relations through, with and around "things." Meanwhile, Ingold (2007) has objected vociferously to the term "materiality," suggesting it represents an unfortunate slippage:

> Suffocated by the dead hand of materiality, this world can only be brought back to life in the dreams of theorists by conjuring a magical mind-dust that, sprinkled among its constituents, is supposed to set them physically in motion. It has come to be known in the literature as *agency*, and great expectations have been pinned upon it. Action, we are told, follows agency as effect follows cause. (p. 11)

Ingold prefers to stick with the more modest term "material": "In the phenomenal world," he says, "every material is a becoming" (2012b, p. 435).

In his *Phenomenology of Practice: Meaning-Giving Methods in Phenomenological Research and Writing*, van Manen (2014) outlines five "existentials" or universal themes structuring human life: relationality (lived relation), corporeality (lived body), spatiality (lived space), temporality (lived time), and materiality (lived things) (p. 302). Here "materiality" refers to our prereflective apprehension of or meaningful encounter with the things of our world, for example, as "ready-to-hand" (Heidegger 1962) or as "the materialization of our subjectivity" (van den Berg 1972,

p. 32). Materiality may be used to describe the "the moral force [things and technologies] exert on and in our lives" (van Manen 2014, p. 307), or too, the relational "language spoken by the things in [a person's] existence" (van den Berg 1972, p. 32). Finally, Adams and Yin (2014) employ a related term, "mediality" to denote lived technologies (p. 227). Mediality points to the media ecological insight that every technology in use is also a medium. That is, a technology convenes a unique environmental ground or atmosphere, and it mediates—conditions, translates, and even transforms—our experience of the world.

Interviewing Objects

Interviewing

To give objects a voice in research, we recommend employing what Latour (2005) calls "specific tricks" (p. 79) to invite the things of everyday life and work practice to talk to us. Latour (2005) explains that these tricks enable things "to offer descriptions of themselves, to produce scripts of what they are making others—humans or nonhumans—do" (p. 79). We, the authors, did not begin our own research projects with such tricks in mind. Indeed, we both found ourselves struggling to articulate the unique contributions digital technologies were making in the teaching practices and learning activities we were investigating: Adams' phenomenological-based (Adams 2006, 2010, 2012, 2016, 2017; Adams et al. 2014; Adams & Yin 2014; van Manen & Adams 2009) and Thompson's ANT-based (Thompson 2012a, 2012b, 2015a, 2015b, forthcoming). These struggles forced us to experiment with different approaches to encourage things to speak to us. Through these explorations we realized that we had admitted these technologies into our research projects as participants. We began to describe this process as "interviewing objects."

By *interview*, we do not mean conducting an interview in the same way as one would with a human research participant. Rather, we refer to the etymological origins of the term "interview" and its more originary meaning. The word "interview" is derived from the old French verbal noun *s'entrevoir*, and is composed of two parts: *entre*, meaning mutual or between, and *voir*, to see. Putting the two etymological roots together ("inter" + "view"), to interview means to: "to see each other, visit each other briefly, have a glimpse of." To inter-view an object or thing is therefore to catch insightful glimpses of it in action, as it performs and mediates the gestures and understandings of

its human employer, and as it associates with others. Such object interviews entail finding opportunities to observe a thing in its everyday interactions and involvements with human beings or other nonhuman entities. Interviewing objects describes an approach for listening to things, observing them in action, discerning their co-constitutive influences, as well as relations with other entities and beings around them.

Electing to describe our approach as "interviewing" objects may seem to contradict the very stance we advocate: namely dismantling anthropocentric biases and dichotomies. We tend to think about interviewing as formal dialogue between two human beings, often with a set purpose and protocol. Or perhaps we envision it as a one-way process more akin to a demanding interrogation. The job interview, for example, is a kind of interrogation performed by those in positions of power. Yet how far this stands from our meaning! For us, interviewing objects means letting a thing retain its silence—its withdrawn, "dark" character in an everyday context—while gently coaxing it into the light, giving it time and space to speak so that we might take notice. Here interviewing involves a watchful, wondering gaze, or respectful glances.

We also recognize that notions such as voice and speaking are deeply entrenched in our understandings of human language. However, things speak in all sorts of ways that afford opportunities to catch glimpses of them. In Chapter 2, we will discover that things always already speak to us prereflectively—they continuously invite us to respond and co-respond with them: "For the normal person, the object is "speaking" [*parlant*] and meaningful" (Merleau-Ponty 2012, p. 133). Following objects as actors, we will learn that they leave tracings; they act; they beep, buzz, and chirp; they beckon and close ranks; they appear and disappear. Thus, interviewing objects involves both an observational stance, and a listening attitude. The posthuman inquirer attends to the activities of things, and attunes to their ongoing whisperings.

Karen Barad's (2003) notion of *intra-action* may be helpful here. For Barad (2003), citing Bohr, "the primary epistemological unit is not independent objects with inherent boundaries and properties but rather *phenomena*" (p. 815, emphasis in original). Advocating for the idea of intra-action rather than inter-action, she explains that interaction "presumes the prior existence of independent entities/relata" (p. 815). In contrast, with intra-action there are no preexisting entities: "phenomena are ontologically primitive relations" (p. 815). Barad (2003) suggests that it is through the work of intra-acting "that the boundaries and

properties of the 'components' of phenomena become determinate and that particular embodied concepts become meaningful" (p. 815). In other words, an object (indeed, any human or nonhuman) becomes what it is through the mesh of relations in which it is entangled.

Barad's posthuman understandings may be applied to interviewing objects. Consider a pairing of both *inter-viewing* (which emphasizes the mutuality of viewing, i.e., seeing and being seen, touching and being touched) and *intra-viewing* (which emphasizes the intimate relational exposure of viewing). Inter-/intra-viewing blurs the line between the observer and the observed, and instead assembles a hybrid configuration, where the movement and relational discourse between the human interviewer and the nonhuman interviewee unfolds in glances and co-respondings. As Michael (2004) argues, entities should not be "spoken 'about,' 'for,' or 'of.'" Instead the researcher "speaks 'with,' 'by,' 'through,' and 'as' these entities" (p. 20). In intra-/inter-viewing, the hyphen linking two apparently disparate things (e.g., human-technology) necessarily fades as boundaries leak and dissolve, such that it becomes impossible to distinguish where the human begins and ends relative to the nonhuman. Here, the necessarily performative nature of posthuman inquiry (and indeed all inquiry) is acknowledged.

The Heuristics

Posthumanism asks us to think research and its technology-saturated practices anew. In this book, we present a set of eight heuristics to support researchers and practitioners to begin to play with new methodological possibilities in light of the nonhuman turn. Each provides a way of *speaking with things*, i.e., making visible and questioning relevant nonhumans found at one's research site or in one's personal and professional lifeworld. The heuristics derive from our own posthuman research inquiries investigating the materialities of work and learning practices. They have evolved from our previous writings (Adams & Thompson 2011; Thompson & Adams 2013): we have added two new ones, and merged others together. Although our primary focus is on digital things, our object interviewing heuristics are also applicable to other nonhuman entities.

A heuristic is not step-by-step procedure. It is not an algorithm that can promise a particular outcome. Rather, a heuristic is a somewhat messy "starting point for further experimentation or refinement" ("Heuristic Methods" n.d., para. 17). It is an invention or approach hoping to discover, uncover, or find out something new. Such an approach is a way of

traveling, in the mood of *methodos*. The researcher or practitioner starts out on a footpath taken by others before, but with an eye for surprises and a willingness to make unexpected detours. The posthuman ground being cut here is relatively new. But as with all forms of qualitative research, the worth of such inquiry rests on its practitioner's ability to remain open and tentative, not closed and certain. Thus, the heuristics are *not* intended as prescriptive methods, but are offered as *possible approaches to inquiry* based on our own experiences using phenomenology (Adams) and ANT (Thompson) to explore the involvements of particular technologies in use in learning and work practices and spaces. In the epilogue to his essay, *The Thing*, Heidegger (1971) offers this methodological advice:

> Everything here is the path of a responding that examines as it listens. Any path always risks going astray, leading astray. To follow such paths takes practice in going. Practice needs craft. Stay on the path, in genuine need, and learn the craft of thinking, unswerving, yet erring. (p. 184).

Likewise, our heuristics are offered in the responsive but disciplined spirit of *methodos*: of discovering, navigating, and practicing a new path that is "a responding that examines as it listens" to the speaking of things.

Each heuristic provides a different sensitivity for recovering nonhuman contributions at the research site. Not all need to be applied, not all questions asked. Indeed, the interview data generated via the application of one heuristic may overlap with and support insights discovered through the use of another heuristic. For example, studying breakdowns and accidents tends to reveal taken-for-granted human-technology-world background relations, and may also serve to uncover hidden details of a technology's amplification/reduction structure. Finally, the heuristics may be implemented as a standalone approach to inquiry or as adjunct to other research methodologies. Not all may be applicable in a single study. By employing a composition of ANT- and phenomenology-based queries, overlaps as well as contradictions are expected. In this regard, we suggest researchers consider possible alignments as well as misalignments with their own philosophical, theoretical, and methodological commitments.

Organization of This Book

In Chapters 2 and 3, we delve into the eight heuristics for interviewing objects and speaking with things. The chapters are loosely aligned

with the two main methodological gestures of qualitative research: data collection (attending to objects, attuning to things) and data analysis (loosening the meshwork, analyzing medialities and materialities). As in all such research practice, the division between data generation and analysis often overlaps, interacts, and blurs, and so too, the use of the different heuristics is far from linear. We also organize the chapters in this way to provide a kind of curriculum for researchers and practitioners to try out and integrate these different forms of questioning things into everyday practice. Trying out some or all of the heuristics at one's research site, professional context, or everyday life situation will help the reader develop the attentive eye and critical sensibilities needed to conduct this kind of posthuman inquiry.

We introduce each heuristic with suggested object interview questions. We then provide an introduction to each heuristic supported by examples from our own research, and augment our discussion with additional empirical examples from the literature as well as from everyday practices. Each heuristic is presented in a somewhat different style and tone. In each instance, this difference tries to reflect the primary theoretical frameworks or philosophical roots from which it is derived and used. In some cases, we explicitly point to these differences, as for example, in Heuristic 1 (Gathering Anecdotes). Chapter 2 focuses on heuristics for attending and attuning to what objects and things may be "saying" and "doing" in everyday situations, and to gathering the kinds of material needed for further analysis. They include:

1. Gathering anecdotes;
2. Following the actors;
3. Listening for the invitational quality of things;
4. Studying breakdowns, accidents, and anomalies.

Chapter 3 introduces four analytic heuristics to help untangle, make sense of and gently loosen the meshwork of everyday practices in order to reveal otherwise hidden aspects of our involvements with digital things:

5. Discerning the spectrum of human-technology-world relations;
6. Applying the Laws of Media;
7. Unraveling translations;
8. Tracing responses and passages.

By no means do we intend for these heuristics to be pursued as a step-by-step program for conducting posthuman research. Rather, each heuristic provides a new lens for examining the same situation, to be employed in the service of provoking new (posthuman) ways of thinking the digital, and of supporting new insights that would be otherwise inaccessible.

Having explored each of the object interview heuristics in detail, in Chapter 4 we invite researchers and inquirers to reflect on the digital objects of research itself, such as digital recorders, qualitative data analysis software, and data. We suggest that these digital things participate as co-researchers in research practice and knowledge construction, and inevitably introduce new tensions and contradictions. The work of researchers includes researching the digital, researching with the digital and grappling with digitally generated and massaged data. Here, researchers are encouraged to interview the objects of their own scholarly practices.

In our final chapter, we consider some of the practical tensions that have been introduced by the digital and trace some of the new digital fluencies demanded of researchers and professionals today. In the context of posthumanism, the term fluencies gives way to *confluencies* which carry implications for ethical, pedagogical, and policy responses in the workplace, society, schools, and higher education.

CHAPTER 2

Attending to Objects, Attuning to Things

Abstract We present our first four heuristics for interviewing objects: gathering anecdotes, following the actors, listening for the invitational quality of things, and studying breakdowns, accidents, and anomalies. These heuristics focus on attuning the reader to the objects and things of practice, and on gathering the kinds of qualitative material needed for further posthuman reflection and analysis. Each heuristic begins with suggested object interview questions and is followed by an in-depth description of the heuristic's theoretical underpinnings, practical applications, and examples.

Keywords Anecdotes · breakdowns · following the actors · invitational quality

Attending to objects, attuning to things involves seeing the everyday world anew. Andrew Pickering (2005) describes this binocular, posthumanist vision as "seeing double: seeing the human and the nonhuman at once, without trying to strip either away" (p. 31). Such sight is not given by the eyes of the hard scientist who "fix[es their] gaze on a material world from which all traces of humanity have been expunged"; nor is it available to the social scientist who attends only to "its residue—a social world from which the material world has been magically whisked away by linguistic conjuring tricks" (p. 31). Instead, attending to objects, attuning to things strives to mend this disciplinary split, and return to the world as we experience it

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prereflectively: "not in its raw state (as studied by physicist or ecologists, say) but as drenched in *meaning*" (p. 30, italics in original). This is the moment of the lived now, in the flowing contexts of practice, before human subject is sharply cleaved from nonhuman object; before nature is separated from artifice, virtual from real, and inside from outside.

The four object interview heuristics described in this chapter provide entrance to this posthuman way of apprehending the world. Attaining such binocular vision also depends on doing. Thus, as you are reading, we encourage you to also make a study of and interview one or more of the things found in your everyday world or workplace surroundings.

Heuristic 1: Gathering Anecdotes

Interview Questions

- Describe how the object or thing appeared, showed up, or was given in professional practice or everyday life. What happened?

Bruno Latour opens his 1992 essay, *Where are the missing masses? The sociology of a few mundane artifacts*, with an anecdote:

> Early this morning, I was in a bad mood and decided to break a law and start my car without buckling my seat belt. My car usually does not want to start before I buckle my belt. It first flashes a red light "FASTEN YOUR SEAT BELT!", then an alarm sounds; it is so high pitched, so relentless, so repetitive, that I cannot stand it. After ten seconds I swear and put on the belt. This time, I stood the alarm for twenty seconds and then gave in. My mood worsened quite a bit, but I was at peace with the law—at least with that law. I wished to break it, but I could not. (Latour 1992, p. 225)

This little story provides Latour with a concrete example to reflect on where moral agency resides. Does it reside with the "human driver, dominated by the mindless power of an artifact? Or is the artifact forcing . . . a mindless human, to obey the law?" (p. 225). His humorous seatbelt tussle also anchors his analysis of this and other everyday objects (keys, doors, speed bumps) in the familiar, quotidian ebb and flow of everyday life. Whether such a moment actually happened or was an invention of his imagination, the anecdote gives both Latour and the reader occasion to consider a recognizable, or at least plausible, event at depth.

But what is an anecdote? And how may it serve as a heuristic to sharpen the sensibilities of a researcher to the things of everyday practice? Most familiarly, anecdotes are little stories—*petits récits*—woven into the fabric of ordinary conversation. In telling an anecdote, we are recounting in lived-through detail an incident or life happening that strikes, interests, or otherwise concerns us. For van Manen (2014), anecdotes constitute key data for phenomenological inquiry: "the 'anecdote' lets one grasp meaning experientially" (p. 250). Specifically, an anecdote is a concise narrative that usually describes a single event, is told in the present-tense immediacy of the now, includes important concrete details, and often closes with "an effective or 'punchy' last line" (p. 252). An anecdote speaks for a specific incident or moment, "*as it happened* and *in experiential terms*" (p. 34, emphasis in original). It is "a narrative device that is concrete and taken from life (in a fictional or real sense) and that may be offered as an 'example'" (p. 250). As description, an anecdote eschews theories, categorizations, and causal explanations. It details *what happened*, not why it happened. An anecdote—and indeed the whole of a strong phenomenological or sociomaterial text—does not try to explain or argue, but rather it describes and *shows* (van Manen 2014).

As with Latour's seatbelt tale, it is not so important that an anecdote be *factually* (i.e., verifiably) correct, but it must be *fictionally* true. That is, it must be plausible or recuperative of the lifeworld. An anecdote must *reassemble* and *resemble* a possible human experience or observed moment of everyday life. Acknowledging the fictive status of anecdotes is also an admission that *all* research texts involve a kind creative reconstruction, selective cuts, and even poetic invention. To describe the lived-through moments of our lives, or to render an observed event in words, we must necessarily rely on the taken-for-granted fundament and limits of human language to convey what we experience and notice. Too, much of the world as we experience it cannot be described, and so must fall silently between the lines. All such descriptive texts are necessarily *attempts* to recapture and render intelligible what appeared to us originally and prereflectively before language. The anecdote, like all texts, is a fabrication.

Posthuman Anecdotes Show Things Thinging, and Nonhumans Doing

The anecdote holds a place of particular significance in posthuman research. In reassembling and simulating via textual description the unfoldings of everyday events, the anecdote speaks for and of the appearance (and nonappearance) of things. It shows how human and nonhuman

doings and undoings are woven into, entangled with, and implicated in ordinary as well as extraordinary life happenings. In this sense, the anecdote is explicitly "a device for making comprehensible what may be called the phenomenon of *conversational relation* which every human being maintains with his or her world" (van Manen 1989, p. 249). The anecdote describes—both implicitly and explicitly—our ongoing intimacy with things.

Even if no things are directly mentioned in a particular anecdote, they are nonetheless there as background, as atmosphere, as inescapable presences quietly shepherding and transparently shaping the current situation:

> Wherever the I turns, there are things, and when it closes its eyes, they still haunt its imagination with the presentation of odors, sounds, tastes, almost imperceptible sensations through which things still pulse their vitality . . . From its inception to its conclusion, mortality is marked by the finitude of being conditioned, *bedingt*, as Heidegger says, by things (*Dinge*). (Benso 2000, p. 144)

Not even hermits are exempt from this indefatigable encounter with things! We are, so to speak, always already *surrounded*. Anecdotes enable humans and their thing-saturated surround to show themselves as they *are and are becoming* with the restless vitality they enjoy "in the wild"—from lightening fluidities to halting stoppages, from attentive passivities to tightly choreographed performances. Such "descriptive constructions" (Hirschauer 2006, p. 436) allow us to reassemble the eventing lifeworld, and then, through reflective analysis, to unravel some of its invariant aspects and evolving complexities.

Two kinds of anecdotes may be distinguished: the first-person experiential and the third-person observational. Both types of recounting may be found in phenomenological and sociomaterial studies. Phenomenological inquiry tends to privilege first-person, lived experience descriptions (LEDs) while Actor-Network Theory (ANT) favors detailed observations and reports. A phenomenological anecdote, for example, aspires to emulate the "unreflective life of consciousness" (Merleau-Ponty 2012, p. xxx). A sociomaterial anecdote aims to take a "democratic" approach by acknowledging the presence of both human and nonhuman actors enacting and enacted by practices, or more radically, it "turns a technological object into the central character of a narrative" (Latour 1996, p. vii).

Constructing Posthuman Anecdotes

Anecdotes, whether first-person narratives or third-person observations, recreate everyday events and situations where both humans and nonhumans participate and have a say. They weave together one or more aspects of the lifeworld that have been previously held asunder: humans and nonhumans, subjects and objects, inner and outer, active and passive, cognitive and noncognitive meaning, etc. The raw material for constructing posthuman anecdotes may be gathered from multiple sources. Conventional sources may include in-depth interviews with humans as well as field observations. The first-person, LEDs that are generated via phenomenological interviews, for example, may reveal much about how different digital technologies are caught up in the prereflective stream of people's lives. The descriptive notes generated via sociomaterial-oriented observations offer witnessed tracings of humans and nonhumans in action. Other sources may be tapped including personal experiences, online sources (from social media to news items), participant or researcher journals, historical documents, reports and policy edits, technical manuals, as well as film, photographic images, novels, visual art, and poems. The criterion for inclusion is simple: does this source reveal something about how a given technology is taken up, used, integrated, mobilized in professional practice or in everyday life?

Interview transcripts, observational notes, or journal entries generated in a qualitative study that did not overtly focus on digital technologies may sometimes be used to reconstruct anecdotes. However, richer material is more likely to be gathered if the researcher is committed from the outset to uncovering and reassembling detailed renderings of given technologies in use. To conduct posthuman, thing-sensitive interviews with human participants, the researcher must be alert to the digital technology of interest, and be attentive to the variety of nonhumans that appear (and disappear) as the human participant describes their everyday practical involvements. Human interview prompts may include, "Can you think back to the last time you used technology X? Where were you? Can you walk me through what happened? Can you recall any other moments involving technology X?" Such questions sometimes yield vivid, detailed accounts and recollections.

The following anecdote was culled from a phenomenological interview investigating the experience of teaching with PowerPoint (Adams 2010). At the outset of the interview, the research participant—a university professor—declared that he almost never used PowerPoint to teach. He admitted he

held a strong bias against the software, though occasionally he did find himself using it. When pressed to recollect such an occasion ("OK. Can you recall the last time you used PowerPoint in your teaching?"), after a few moments' reflection, he described the following incident:

> Not so long ago, I gave a lecture for a PowerPoint-loving colleague of mine who had to be away. Standing before his students, I opened his PowerPoint file on my laptop, the whole system struggling to cope with the gigantic file. While we are waiting, I tell his students that their professor has left me 143 slides to cover today. "That means," I calculate, "one slide every 21 seconds. So we better hurry up and get started!" (p. 9)

This anecdote shows how PowerPoint may serve to define teaching in terms of coverage and slides per hour; predetermine the teaching and learning pace (in this case, hurried and relentless); and drive a lecture with potentially few openings for questions or meaningful diversions. It also hints that PowerPoint may incline instructors toward efficient, slide-driven styles of teaching and learning. No doubt the professor's rendering of the incident suffers from some exaggeration (particularly in light of a declared bias). Nonetheless, like Latour's seatbelt tale, the anecdote still gives insight into the unique practices that may be mobilized and pedagogical concerns invoked when PowerPoint is the educational technology in use.

Sometimes a particular technology is so taken for granted or integrated into practice, it escapes the participant's notice and thus recall. We will discuss this transparent or ready-to-hand quality of technologies in more depth later in the chapter. For now, it is important to realize that different technologies often require different approaches in order to catch glimpses of their involvements. This is where the other heuristics may also prove useful. For example, by following the actors (Heuristic 2), the researcher steps back from what is said by human actors and instead attends to how all the participants—human and nonhuman—are interacting and doing.

To observe or otherwise take into critical account one's own relational involvements with digital technology, we suggest two possible approaches. The first entails recollecting one or more recent or otherwise memorable technology-in-use events (e.g., a breakdown—see Heuristic 4 at the end of this chapter), and then writing down in concrete, lived-through detail what transpired. The second approach involves observing one's own involvements with a digital technology as one is using it at home or at work. To accomplish this, however, it is crucial to do so via a kind of peripheral or

"averted vision." Averted vision is a practice employed by astronomers observing the night sky by looking slightly off to the side of an object, but nonetheless attending to it. In a similar way, in order to catch glimpses of a technology-in-action, we must avoid staring at it, but instead find a way to observe ourselves unselfconsciously *in situ*, out of the corner of our eye, at a near distance. Otherwise, we may inadvertently disturb and thus lose contact with the transparent absorption that we ordinarily and primordially share with our technologies in use. With a bit of practice, it is possible to break from using the technology periodically to record one's observations, and then return to the immersion of one's technology-infused world.

Some anecdotes may be found whole cloth, for example, a compelling blog post about a particular incident (see e.g., Adams et al. 2014, pp. 205–206), a potent passage from a novel, or a lived experience description recalled by an especially perspicacious study participant. For found descriptions that are interspersed with explanations, the explanatory passages may be excised with an ellipsis (. . .). More often, though, the researcher must inventively reconstruct anecdotes from a variety of sources in order to provide a more co-constitutive account of humans thinking, dwelling, and building with and through their nonhuman surround. So it is up to the posthuman researcher to gather observational threads and interview snippets, then carefully weave human and nonhuman storylines back together. While not explicitly focused on things, Crowther, Ironside, Spence, and Smythe (2016) provide a concrete example of how transcribed verbatim interview data may be culled, edited, and honed as a phenomenologically potent anecdote. For the posthumanist researcher, such artisanal work or "story crafting" (p. 1) aims toward recuperating the eventing human-nonhuman lifeworld.

Anecdotalization in ANT-based inquiries may involve a more radical decentering of the human. Mulcahy (2012), who uses the term "enactment" rather than anecdote to denote her reconstructed "data stories," suggests that storying the materialities of practice is not a simple recipe of "add material objects (to the account) and stir" (p. 135). She acknowledges that the human subject tends to be the "privileged starting point for analysis educational research" (Mulcahy 2013, p. 1287), precisely what sociomaterial (and especially ANT-informed) research attempts to disrupt. Mulcahy explains her relational materialist accounts are instead scaffolded using human subjects as starting points. Rather than regarding the individual—or their story—as "autonomous, unitary and coherent," she seeks to unfold each as a network effect comprised of a myriad of social and material relations

(Mulcahy 2013, p.1287). Thus, it is often up to the researcher to weave these human and nonhuman storylines together.

Plum (forthcoming) describes the shift she made when writing socio-material accounts:

> To relate to the world . . . not of subjects who know or act upon objects, but as assemblages enrolling different elements . . . undermines the subject/object divide. . . . Thus, in my analysis I write about actions taking place as things come together in a web of connections: I write about connections made between researchers, day care centres, tests and books; as opposed to writing about researchers who use tests on children who read books. Writing about the world in this manner is as such an attempt to analyse it in a particular way.

Here, Plum highlights the decentering of human participants by focusing on the connections and work happening *between* actors. This entails stepping back from what is said by human actors and instead delving into how all participants in an inquiry (human and nonhuman) are interacting and doing. Including the tracings of objects (i.e., digital things) in an anecdote is not merely mentioning their existence or presence in a particular practice, but rather providing a meaningful acknowledgement of the specific work they do (or do not do). For further examples of the range of approaches to ANT-based anecdotalization, see Röhl (2015) and Fenwick (2014a). Finally, object voices and the speaking of things may not translate easily into the block quote format popular in qualitative reports. Instead, thing anecdotes may sometimes be found woven directly into the research text rather than separated out as "data" (see Adams & Yin (forthcoming), van Manen (2012)).

To anecdote is to attempt to reassemble and resemble the concrete, lived-though particulars of the eventing lifeworld, and thereby prepare a space to reflectively grasp and analyze our prereflective conversations with (digital) things. Posthuman anecdoting explicitly gathers human and nonhuman actors, providing a way for things to speak, as well as a way of speaking with things. The work of posthuman anecdoting demands reflectively grasping the human and the nonhuman together: "To anecdote is to reflect, to think. In a reflective grasping, anecdotes recreate experience but in a transcended (focused, condensed, intensified, oriented, and narrative) form" (van Manen 1989, p. 232). For such work, the researcher needs to cultivate the alert ears and patient eyes of the devoted bird watcher, but in

this instance, a birder attentive to the murmuring hubbub and dazzling glints of the digital—its hardware and software—in action. The anecdotalization of data enables the researcher to offer a more co-constitutive and coauthored account of everyday practices.

Anecdotes as Reassembled Resemblings in the Enactment of Research Practice

Anecdotes do more than retell stories about things and relations of practice. They themselves are performative assemblages and (re)creations that reassemble, resemble, resonate, move, animate, fold and unfold. Anecdotes speak, they show, and as Michael (2012) points out, "they do" (p. 26). In research practice, anecdotes act as epistemic objects. Knorr Cetina (2001) explains that epistemic objects are "processes and projections rather than definitive things," characterized as "open, question-generating and complex" (p. 181). They are "objects of knowledge" that

> have the capacity to unfold indefinitely. . . . Since epistemic objects are always in the process of being materially defined, they continually acquire new properties and change the ones they have. But this also means that objects of knowledge can never be fully attained, that they are, if you wish, never quite themselves. (p. 181)

For Michael (2000), the anecdote "allows one to start from an incident and trace out a range of associations" (p. 14). As such, it may serve as a key entry-point creating, in Latour's (2005) terminology, conduits into the rest of one's data. In this way, anecdotes are themselves material entities that connect and circulate with other material data configurations. As epistemic object, the anecdote is both generative and disruptive.

> The anecdote . . . incorporates the performativity of research—i.e., the way that research is not a mere reflection of something (e.g. one's experiences in relation to social or cultural process) out there, but is instrumental in, and a feature of, the 'making of out theres'. (Michael 2012, p. 26)

Anecdotes are not simply "data upon which we work" (Stronge & Michael 2012, p. 28). Rather, "the 'flow' of anecdotization means that they end up as something akin to 'heterogeneous interlocutors' in the inventive of doing research" (Michael 2012, p. 34).

In constructing anecdotes, it is thus crucial that posthuman researchers attend to Haraway's (1997) critique and revision of the researcher as "modest witness":

> The modest witness [of modernity] is the legitimate and authorized ventriloquist for the object world, adding nothing from his mere opinions, from his biasing embodiment. And so he is endowed with the remarkable power to establish the facts. He bears witness: he is objective; he guarantees the clarity and purity of objects. His subjectivity is his objectivity. His narratives have a magical power—they lose all trace of their history as stories, as products of partisan projects, as contestable representations, or as constructed documents in their potent capacity to define the facts. The narratives become clear mirrors, fully magical mirrors, without once appealing to the transcendental or the magical. . . . I would like to queer the elaborately constructed and defended confidence of this civic man of reason in order to enable a more corporeal, inflected, and optically dense, if less elegant, kind of modest witness. (p. 24)

As Introna (2016) suggests, researchers should "*not* incorporate the other (or all others) into the epistemic practice merely in our own terms but also allow it/them to cut/become in their own terms" (p. 10). The challenge is to let the things of the world speak for themselves but also to recognize the limits of our necessarily situated understandings. Object interviewing involves both inter- and intra-viewing: the researcher cannot separate themselves from their intimate relational rapport with things.

Finally, the anecdote also provides one possible way to address the poststructural challenge issued by nonrepresentational (or "more-than-representational") research to

> share empirical narratives that make sense—or that, in other words, are inspired by and feel coherent with the world as encountered—while simultaneously underscoring the situatedness, partiality, contingency, and creativity of that sense-making. (Vannini 2015, p. 318)

Through reassembling and emulating a situated, embodied, unfolding event, the anecdote tries to speak without speaking, and name without naming "the fleeting, viscous, lively, embodied, material, more-than-human, precognitive, nondiscursive dimensions of spatially and temporally complex lifeworlds" (p. 318). To accomplish this rhetorical performance of resembling the "ordinary scenes of living through what is happening"

(Stewart 2011, p. 446), the anecdote must draw attention to concrete particularities (the appearance of things), attune to lived affects and inescapable intensities, and trace motion and vital gesture. Such discursive creations must strive to accomplish

> a geography of what happens—a speculative topography of the everyday sensibilities now consequential to living through things. An attention to the matterings, the complex emergent worlds, happening in everyday life. The rhythms of living that are addictive or shifting. The kinds of agency that might or might not add up to something with some kind of intensity or duration. The enigmas and oblique events and background noises that might be barely sensed and yet are compelling. (Stewart 2011, p. 452)

The anecdote is no static composition. It adumbrates the lifeworld in motion. In its ambition to reassemble a resembling fiction, the anecdote provides an initial site of research performance. It makes no claim to accuracy or verifiability. Rather it recognizes that all "data," whether qualitative or quantitative, are simultaneously created, collected, and reassembled. The anecdote stands reflexively open and aware of its contingent, tentative, and fictive status as an epistemic object.

Heuristic 2: Following the Actors

Interview Questions

- Consider the main practice or activity you are interested in examining. What micro-practices can you discern? Look closely at how materialities and material actors are implicated in the way these micro-practices are performed.
- Who-what is acting? What are they doing? Are some actors more or less powerful than others? Who-what is excluded?
- How have particular assemblages of actors come to be configured this way? How have these people, objects, ideas, discourses, and events gathered? What is related to what and how?
- What sort of work does this assemblage do or try to do?
- Choose an object of interest. What is the sociality around the object? The materiality?

- Using Michael's (2004) notion of the *co(a)gent*, connect up the key actors implicated in a practice. Ask: What work does this co(a)gent do? What tensions and ambiguities live in the hyphenated spaces joining the human and the nonhuman?

One popular ANT edict is to "follow the actors." And yet, this is not quite as straightforward to do as it may sound. As Latour (2005) muses:

> How ridiculous is it to claim that inquirers should 'follow the actors themselves', when the actors to be followed swarm in all directions like a bee's nest disturbed by a wayward child? Which actor should be chosen? Which one should be followed and for how long? And if each actor is made of another bee's nest swarming in all directions and it goes on indefinitely, then when the hell are we supposed to stop? (pp. 121–122)

Is following the actors as impractical as Latour (2005) jests? By keeping a few caveats in mind and adopting a more nuanced approach, following the actors can be a viable starting point in a posthuman materialist methodology. Although there are several ways that objects can come to our attention, the larger purpose is always to "[map] the relations of practice" (Law & Singleton 2012, p. 7). Materialist methodologies—and ANT in particular—focus on describing specific micro-practices. Once attuned to possible micro-practices of interest, it is then possible to look more closely at how materialities and material actors are implicated in the way these practices come to be and are performed. Following the actors could be considered a way of untangling practices.

For example, in one research project, Thompson (2012a) interviewed self-employed workers to explore how they engaged with others online and the work-related learning practices being enacted. She ended up interviewing the delete button. Although not setting out to study deleting practices, she describes how she became interested in this rather innocuous button as she attuned to how her participants talked about managing their online learning activities. Even though deleting practices were considered rather mundane and simply part of working, learning, playing, and living online, these worker-learners had become completely entangled with the delete button. Deleting is just one of a plethora of online work-learning practices, a list that could also include

searching for information, finding others to connect with, and engaging in online discussions.

Thus, following the actors consists of two related activities: (1) identifying potential actors of interest, and (2) mapping related micro-practices worthy of further examination. Although Thompson (2012a) followed the delete button, she was also mapping the practices and micro-practices of deleting (such as erasing, redirecting, screening, obfuscating, and shredding) and attuning to which actors were gathering to enact these practices.

Similarly, Leslie Gourlay and Martin Oliver (2017) set out to examine postgraduate students' study practices, but then came to realize that there is not a clear set of practices that can be neatly bundled together and labeled as "studying" (p. 75). Instead they focused on a complex of micro-practices such as searching, reading, noting, curating, speaking, and writing. They explain:

> The idea of "following the actor" is important as a way of exploring the series of entanglements that constitute practice. . . . it was possible (for example) to follow Yuki's iPad and create an account of the kinds of study practices and spaces that it was involved with. She used this to curate digitised resources; hold the audio recordings of lectures; make notes; browse online materials; email others; and so on. (Gourlay & Oliver, 2017, p. 79)

Following an actor also means tracking micro-practices and other key actors implicated in those practices. Although identifying and following such entities is a preoccupation of posthuman researchers, how specific objects manage to attract the researcher's attention is not always well articulated. Indeed, deciding which actors to follow (and when to stop) is a persistent dilemma faced by ANT and other materialist researchers. The challenge is how to make the invisible visible, not only objects of interest but also the negotiations that are transpiring to keep an assemblage working.

Objects Coming to Attention

Objects and material practices come to attention in different ways. At the outset it is useful to keep in mind that the point is not to create an exhaustive list of all possible entities in an actor-network but rather to look for "mediators *making* other mediators *do* things," human or nonhuman (Latour 2005, p. 217). Sometimes, researchers head into a study with

a particular object in mind. For example, Decuypere and Simons (2016) started with digital screens in mind, examining how they come into being differently in academic practices as they act and are acted upon by different actors. Following the screen(s) enabled them to attune to how other actors, including the academic, were constantly being repositioned.

At other times, it may be the object that creates barriers or the one that seems to nurture "gatherings" that captures our interest. In Zukas and Kilminster's (2014) study of how junior doctors' professional learning unfolds as they transition to new levels of responsibility, objects that seemed to create inconvenient hurdles attracted their interest; but they also found themselves attracted to the "blue form," which seemed to gather bureaucratic, pedagogical, epistemological, and clinical practices and knowledges (p. 45). In her sociomaterial study of engineer's professional knowing in practice in the emerging renewable energy industry, Jenny Scolles (2016) describes how she became aware of the importance of the "signature" on contracts:

> It became apparent that obtaining a signature on a contract was the driving force of TurboUK's work. The signature was very vocal throughout my observations. It was mentioned in nearly every meeting, and referred to in conversations and documents as a singular, standalone object—a reified thing. I felt I would turn a corner one day and bump straight into it, a physical presence, revered and housed in a glass cabinet.

Sometimes researchers may reach a point where they "cannot evade the objects" (Bruni 2005, p. 374). Bruni (2005) describes how he "shadowed" the electronic patient record in a hospital: "[I let] the software guide me through the organization and confront me with other actors and processes" (p. 363). Through such shadowing, the researcher "orients [their] observations to the material practices that perform relations" (p. 374). Similarly, Banerjee and Blaise (2013) describe how they followed the air in Hong Kong to understand and rethink postcolonialism. In so doing, they acknowledge they had no idea at the outset of "where air would take us" and therefore needed to engage actively, question, be willing to follow, and to be found by air (Banerjee & Blaise 2013, p. 241).

Some objects come to attention because they do a lot of work and take on multiple roles. The researcher keeps bumping into them. In Thompson's (2012a) study, the delete button (and its entourage), for

example, delivered multiple performances. It acted as a line of defense against information overload, arbitrated relevance, served to presence and absence other actors, safeguarded against intrusion, and both opened and enclosed spaces (p. 106).

Sometimes it is the contradictions woven around an object that captures attention. In a recent study, Thompson (forthcoming) explores changing mobilities of work-learning practices through the infusion of web and mobile technologies. However, alongside mobilities (of people, ways of knowing, work practices, and devices) that become evident in these practices, immobilities started to assert themselves in the data. She turned to the sociality and materiality of mobile devices to better understand this tension, that is, she started to follow the mobile device. But every object is a complex actor-network. Thompson (forthcoming) describes how mobile devices are entangled with an array of other actors that are often backgrounded: data plans, computer code, YouTube videos, external hard drives, e-books, roaming charges, mobile hotspots, batteries, keyboards, Bluetooth, and server farms.

With any significant (strong) actor, there is likely a buzz of activity in the background—the work of other actors being attributed to the powerful and highly visible actor (Mol 2010). While human participants pointed to their smartphone, iPad, or laptop, other powerful actors became more visible as Thompson continued to follow the actors of interest: screens. She came to see how mobile work-learning practices were not just about working and learning *on* a screen that one carries but doing so *with*, *through*, and *between* multiple screens, and the considerable energies spent curating different sized screens.

As screens became actors of interest to follow, Thompson (forthcoming) asked: What is the sociality around this object? The materiality? Different gatherings around the screen made some assemblages more or less compelling, workable, and mobile. Continuing to follow the actors highlighted the presence of other significant objects such as video tutorials and keyboards. For example, to David, an IT entrepreneur in Kenya, viewability was a challenge. He said, "I rely on video tutorials for much of my learning and they are much more viewable through the laptop." Video tutorials seemed to ask for a certain kind of screen. Keyboards also needed to be nimble to align with various screen possibilities. Dan, a Canadian adult educator, explains: "I can barely type with the keyboard on the screen. It is hard to compose posts or do production type work, like writing, because it is so onerous. I'm not won over to my new smartphone

just yet." By continuing to follow actors of interest, glimpses into how particular actors have gathered and are relating are possible.

Although an object—such as the delete button, a mobile phone, electronic patient record, or a signature on a contract—provides an entry point for a researcher, the focus in sociomaterialist inquiry must be on the "connected" object or as Bruni (2005) describes, the "relational game in which objects are involved (and which objects themselves activate)" (p. 358). This is an important shift. In the example above, it was the delete button *assemblage* and deleting *practices* that were of interest, and not the delete button *per se*. In other words, the researcher attunes to gatherings of actors in a specific practice or the sociality and connectedness around an object.

Does following the actors tend to reify the distinction between individual elements rather than seeing them as interwoven? If so, that might be contrary to the sociomaterial spirit. Fenwick (2014a) suggests that because sociomaterial perspectives view things as effects of connections and activities, the starting point is not an entity *per se* as these entities are already intra-acting (Barad 2003). Although "following the actors" may seem to suggest following a singular entity, it is in fact about tracing complex connections between actors: the actor-*network* or assemblage. Each actor is already a network or amalgam of other actors both close and distant, hence the hyphenated phrase "actor-network." The challenge is not to view an object in isolation. Attending to the different gatherings around an object and its varying material performances propels the researcher and practitioner to think beyond separate entities toward something far more intertwined and practice oriented.

Following the Hybrids: Co(a)gents

We have highlighted the importance of attuning to the connected object. Objects achieve their form and character only in relation to other actors (Law 2008). It is through its relational connections with others that an object becomes and is energized. Latour (2005) points out that the more attachments an actor-network has, the more it exists. Thus, the juxtapositions of actors within a practice are of particular interest. Here, one might take Michael's (2000) lead and *follow the hybrids*. To do this, Michael (2004) employs a construct he calls a *co(a)gent*. This analytical fabrication can be used to more closely examine the connections between human and nonhuman actors, and to analyze what is transpiring in the practice of interest.

Michael (2000) playfully uses a co(a)gent called "couch potato"—an amalgam of person, sofa, TV, and remote control—to show how specific technologies, bodies, and cultures come together and *do*. He then asks, "What is the relationship between body, agency, and technology that the remote control mediates?" (p. 96). Other interview questions to catch glimpses of the remote control in interaction include: When does the couch potato make its appearance? In what ways is this routine? What would happen if one of the constituent parts (i.e., the remote control or the sofa) disappeared?

Here, the strategy of following the actors involves attending to how agency is distributed throughout a network and entangled in multiple actor relations. Michael (2000) explains that deploying this analytical strategy assumes agency to be "distributed, pluralized, contingent" (p. 42). Exploring the tensions and ambiguities that live in the hyphenated spaces between actors (human and nonhuman) opens up further ways to attune to the voices of things. Returning to the earlier example, as worker-learners became entangled with the delete button they became a *delete-button-learner* hybrid, an assemblage enacting the practice of deleting. This assemblage includes person + delete button + digital device + online digitized objects and even current discourses rife with notions of being on top of information, in control, taming technologies, and efficiency. Thompson (2010) was then able to pose interview questions such as: How does the delete button mediate what is kept private or made public? Or, what would happen if there was no delete button? Or, when does the deletebutton-learner fail or succeed at keeping online work-learning practices manageable? Once objects are recognized as hybrids of human and nonhuman actors, the researcher is able to attune to a richer sense of negotiations between private and public, trust and distrust, and control and chaos living in the relations between actors.

We will return to this hybrid complex in Chapter 3, where the relational dynamics of the hyphen are unfolded. For example, in Heuristic 5 (Discerning the Spectrum of Human-Technology-World Relations), the hyphen designates the fleshy connective tissue enjoining human, nonhuman, and the world. In phenomenology, this relation is sometimes described by the notion of intentionality (and renamed by some as "post-intentionality" to distinguish it from Husserl's early conception and point to Heidegger, Merleau-Ponty, and beyond). Intentionality supersedes the classical separation of subject and object, and instead describes the human being as intimately involved and contiguous with their lifeworld. The hyphenated

human Being-in-the-World (*Dasein*) is characterized by the *transpermeation* (Rosen 2006) and intermingling of subject and objects through the "reciprocal insertion and intertwining of one in the other" (Merleau-Ponty 1968, p. 138). Postphenomenologist Ihde (2004) employs brackets as well as hyphens to denote the distinct variations in this co-responding intertwining across different human-technology-world relations.

Following the actors can be a useful starting point for interviewing objects. While it can be easy for a researcher to come up with a list of objects that participate in a practice, all too quickly the number of possible actors of interest can overwhelm. Figuring out which actors matter and which should continue to be traced are important decisions. Attuning to who-what is acting and what they are doing are crucial interview questions. By tracing these relations the researcher begins to get a sense of how particular assemblages come to be: how people, objects, ideas, discourses, and events gather and *do* as an assemblage. Focusing on one actor within a specific practice—the delete button, a worker working—and then tracing the actor-network(s) in which this actor is entangled helps to bring a network of sorts into focus, and creates openings to draw on other heuristics to deepen the analysis.

Heuristic 3. Listening for the Invitational Quality of Things

Interview Questions

- What is a technology inviting (or encouraging, inciting, or even insisting) its user to do, think, or perceive?
- What is a technology discouraging (or constraining, or even prohibiting) its user from doing, thinking, or perceiving?
- What prereflective "conversations" (van Lennep 1987) or gestural "correspondences" (Ingold 2012b, p. 435) unfold between human being and a technology and/or their material surround?
- What kind of scaffolding is a technology explicitly or implicitly offering to help frame thinking, intensify perception, or enhance action?

We dwell in the murmur of things. Our immediate world speaks to us prereflectively. Arriving at my office, the closed door invites me to open it,

the chair behind my desk beckons me to sit in it, the dark screen on my desktop tells me I must power on my computer in order to work, my e-mail tugs at me to check it, the smartphone vibrating in my back pocket insists that I answer it, etc. Of course, I may choose to ignore any or all these entreaties; and in some cases, I may opt to respond in one of multiple possible ways. For example, I may pull my phone from my pocket and answer it, I may touch the ignore button on the screen and send my caller to voicemail, or I could simply leave it in my pocket and try to ignore it until it stops vibrating. But regardless of my response or nonresponse, it is clear that the things of my everyday world speak to me.

With some important exceptions (e.g., "Hey Siri. Wake me up in half an hour." [Pause] "OK, I set an alarm for 6:58."), things speak to us silently: implicitly, winkingly, whisperingly, as undertone or atmosphere. The language of things is, on the one hand, immediately and prereflectively intelligible to us. When I am thirsty, the water fountain outside my office invites me to drink from it. The ping from my smartphone tells me I have an incoming text. On the other hand, things speak to us primarily in tacit tongues more primordial than the familiar language of human discourse:

> Although in a way different from the logocentric tradition, things express themselves. They do so in the purest, most immediate form of expression: through their sheer eventuation . . . Things express themselves in as many idioms as there are things . . . There is no unified language, no Esperanto of things, but rather their symphony in an ecological, polyrhythmic song that each thing, separately and yet jointly, contributes to create . . . To hear the language of things means to enter the spaciousness of things, to let them be as things, and thus to become thingly. (Benso 2000, p. 153)

Our conversational engagements with objects—doors, chairs, monitors, e-mail, smartphones, seatbelts, etc.—are, for the most part, gestural and unspoken. Encountering my closed office door, with hardly a thought, I rummage through my backpack for my keychain, locate my office key, and insert it in the lock. Swinging the door open, I toss my ring of keys on my desk, ready for the day. Here, my hands quietly do most of the talking with the lock and key. The language of things is the language of gesture.

The invitational quality or gesture of a thing is always heard or apprehended in light of our *intentionality*, that is, our indissoluble unity with and orientation to our world, for example, as parent, as teacher, as student, as researcher, etc.

> Nothing can appear without relation to anything else, appearance itself is always contextualized and extended through connections it maintains with its surroundings. . . . When a thing enters the world, we are called by it. Even our indifference is a way of responding to the world. (Mitchell 2015, p. 17)

An object may issue a particular invitation to me, but offer a different or even no invitation at all to another. My closed office door, for example, bids me to locate my jangle of keys to open it; but for a student or colleague who wants to see me, the same closed door prompts a knock or a listen. For yet another passerby, say a student from another faculty, my office door commands barely a fleeting glance. Instead, the door is passed by without notice; it has no significance. Moreover, the human being

> seldom sees objects, things as such, he sees significations which things assume for him. He . . . understands the language that things speak to him. If he does not understand this language in any way, then he does not observe anything either. (van den Berg 1972, p. 31)

Things address us in the situated context of our own personal, social, and cultural horizons of meaning and significances. Too, such pre-understandings provide the "conditions whereby we experience something—whereby what we encounter says something to us" (Gadamer 1976, p. 9). The outstretched hand invites a warm handshake in one culture, but may be unnoticed or awkwardly reciprocated in another. According to Heidegger (2012), the world also discloses itself differently to us depending on the historical epoch we are living in. Currently, we are under the sway of *das Gestell* (positionality), a technological way of being whereby the things of the world tend to appear and speak to us as something to be used and manipulated.

The things of our world may only issue salient appeals to us because they are "exposed" (Mitchell 2015) and may thereby appear to us humans (as well as to other nonhuman entities). In order to perceive and respond to the sensuous surfaces and hermeneutic hintings of things, we too must be exposed to things. In this mutual exposure, an ongoing "mirror play" (Heidegger 1971, p. 179) unfolds. Drawing on Heidegger, Mitchell (2015) tells us that "things are inherently messengerial . . . it is of their nature to be communicative, to bear a message/meaning" (p. 164). They "hint" or wink (*winken*) at us. To wink is

> to intimate and stand in expectation, to near, and to call something here, bring it forth, and/or awaken it. The term can also mean "to wave," where the gesture of waving can beckon, greet, or invite . . . Perhaps most importantly, the wink shows that one is in league with another. (p. 165–166)

A thing's intimations beckon us to draw near and to respond in an apt or "fitting" manner (Heidegger 1972, p. 187). To respond fittingly is to co-respond with or answer the call of a particular thing—to unlock or knock at the office door, to sit, to check my e-mail, to pull out my smartphone and answer it or not, to take a drink of water, to compose a lesson in PowerPoint. Having responded fittingly, I am swiftly drawn into and caught up in the unique world that each thing opens for me: my bright, familiar office; the sedentary posture that a chair affords; the endless message and response world of electronic mail; the warmth of a friend calling to set a coffee date; the thirst-quenching goodness of a small cascade of cold water; the windowed software environment of slides, bullets, and images, etc. Each of these worlds calls for my "concernful absorption" (Heidegger 1962, p. 102), if only for a fleetingly moment, or for hours on end.

In fact, our embodied selves are always already dwelling in the midst of an ongoing, primordial "rapport with things" (Heidegger 1971, p. 157). Or, as James Hillman (1982) puts it: "I am held in an enduring intimate conversation with matter" (p. 89). These primarily silent, ongoing corporeal conversations with our vibrant sociomaterial surround may be glimpsed by attending to the invitational quality or vocative appeal of things. Here the researcher or practitioner asks: what is a particular technology inviting me (or its user) to do? What is it implicitly or explicitly discouraging or even prohibiting me (or its user) from knowing, doing, or thinking? Having responded to an invitation, what prereflective "conversations" (van Lennep 1987, p. 219) or gestural "correspondences" (Ingold 2012b, p. 435) unfold between human being and technology and/or surroundings? For example, investigating the use of PowerPoint, Adams asked (2010): What is PowerPoint's vocative appeal to a student or teacher within the lived space of the classroom? What invitations and intimations does PowerPoint make to a teacher as they compose a teaching presentation? What prereflective conversational engagements ensue?

> The call or appeal of PowerPoint is at once a linguistic gesture ("Microsoft PowerPoint," "Click to add title," "• Click to add text"), a promisingly familiar visual digital environment, a complex hermeneutic horizon of

> previous PowerPoint experiences, as well as entrance to an intentional, architected form, a windowed milieu that the teacher may traverse with her eyes upon screen, fingertips on keyboard, hand on mouse . . . Reaching out with anticipation of PowerPoint's promise to help her point powerfully, the teacher orients herself toward her windowed screen; her being is drawn in and gently caught in the "draft" of PowerPoint, the unique horizon of possibilities it brightly offers.
>
> Within the PowerPoint environment or milieu, the teacher's work materializes as an accumulating series of slides. The basic elements of each slide are text, images, color, and animation. She composes, adjusts, tries out new fonts, samples colors, switches "views," plays with order. She is engaged representing content as slides, then imagining the presentation in the immediacy of a classroom with her students. Slides, subject matter, the vision of her students, and her presentational and teacherly intentions intermingle.
>
> In performing this preparatory work, the teacher is sitting in her office with computer, screen, keyboard, and mouse; texts and papers litter the desk. Her screen shows numerous windows open: a web browser, e-mail, a Word document, as well as PowerPoint. Occasionally, her eyes wander from the screen, and stare thoughtfully out her office window into the distance. She turns back to the PowerPoint window, pulls her keyboard a little closer, nudges her mouse, and continues work. Once the teacher is engaged in her preparation work, her office, desk, screen, keyboard, and mouse recede into the background. PowerPoint too withdraws from full view, fading to a transparent framework, a sophisticated but peripherally present set of tools that she may variously call upon to perform her presentation design activities in this digital world.
>
> The work-object or focal project of our instructor is not PowerPoint. Her project is the classroom situation she will find herself in a few days hence. As teacher, her primary intention is to creatively assist her students in learning the particular subject matter at-hand. For this purpose, for this subject matter, she has chosen to use PowerPoint. Thus, while the presentation software frames and facilitates her activity of planning a lesson, PowerPoint is not the main objective and intention, anymore than canvas and paint palette are the objective and intention of the artist. Nonetheless, we must also notice how the instructor's activity patterns and meaning structures are also being quietly in-formed—conformed, deformed, and reformed—by the architecture of the particular software she finds herself inhabiting. (p. 5–6)

In seizing hold of PowerPoint as a tool to do her work, the teacher finds herself simultaneously enmeshed or *caught* up in the particular design imperatives, decisions, and suggestions embedded in this software. In this way, attending or "listening" to the invitational appeal of things

gives us aperture to the unique "ongoing horizon of meaning and action" (Introna 2009, para. 22) a digital technology may support and unfold in the context of our teaching and learning worlds.

Affordances and Valences

Those who have encountered Don Norman's work in human-computer interaction (HCI) and design studies may recognize a kinship between invitational quality and the concept of "affordance," a term he borrowed from ecological psychologist J. J. Gibson. For Norman (1988):

> The term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used . . . Affordances provide strong clues to the operations of things. Plates are for pushing. Knobs are for turning. Slots are for inserting things into. Balls are for throwing or bouncing. When affordances are taken advantage of, the user knows what to do just by looking: no picture, label, or instruction needed. (p. 9)

Norman's (1988) interest is in designing technical objects whose affordances or operating possibilities (what something "is for") are self-evident to the "user." The idea is to materially encode a manufactured object's utility and usability at the site of the user interface. The mark of a good design is when the "face" (whether surface or interface) of the technical artifact communicates its proper function and operation to its user, that is, what something is for and how to use it. Unlike the things of nature, where affordances are perceived only by the happenstance of naturally occurring material characteristics, Norman advocates that the affordances of manufactured objects should be explicitly designed into the artifact. If an object's affordances are not apparent to its user, it is, for the moment, useless. For the phenomenologist, such apparentness or appearance is a pathic sensibility, that is, something we prereflectively grasp as we appropriate an instrument for our purposes. Ultimately, human-computer interactionists, designers, and architects are interested in facilitating and shaping this everyday primordial but taken-for-granted relationship we convene and share with manufactured objects and places.

While Norman's (1988) design view of affordance recognizes that things speak to us, or at least are able to communicate "strong clues," he nonetheless downplays the ontological commitments and medial enfoldments of human-technology relations, and instead situates primary

interest in the ontic, or the explorable, designed surface of things. In his appropriation of the term "affordance," Norman constricts Gibson's value-laden, ecological understanding of our relations to things to denote only the "perceived and actual properties" of an artifact. Our prereflective, ongoing but potently pathic rapport with things is quietly expunged. Attending to the invitational quality of things provides a way of recuperating some of Gibson's lost meaning, specifically the insight that our relationship to things is co-constitutive, ecological, and precedes subject/object boundaries.

In his book, *The Ecological Approach to Visual Perception*, Gibson (1979) describes "affordance" as the action possibilities that an object (or an environment) enables, offers, or affords a creature. For example, a rock affords a lizard shelter from the sun, allowing it to control its body temperature. Certain objects afford a particular activity, while others may not. We may imagine another rock situated so that it seldom affords cool shelter for a lizard. Affordance also depends on the action capabilities of the individual or animal. The surface of a lake does not afford walk-on-ability to a wolf or a fish, but it does to a water-skater insect. An open window on second floor may afford entrance to the burglar, but not to the toddler in the yard. Affordance is thus both functional—dependent on the enabling (and constraining) material possibilities of the object—as well as relational—dependent on the material possibilities of the creature relative to the object. This much Norman is in agreement with.

However, an affordance, according to Gibson (1979), "is neither an objective property nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy" (p. 129). Or as Latour (2005) points out, "object and subject might exist, but everything interesting happens upstream and downstream" (p. 237). An affordance is perceived or apprehended by the creature directly (and in the case of human beings, preobjectively, presubjectively, and prereflectively) and in correspondence to its own materiality. Gibson (1979) goes on to claim that "the affordance of something does not change as the need of the observer changes . . . The object does what it does because of what it is" (p. 139). Meaning is discovered in the world in the way things reveal themselves to a particular creature or situated person.

Gibson (1979) credits his "radical hypothesis" of affordances (p. 127) to Kurt Lewin's *Aufforderungscharakter*. Lewin's term has been translated

variously as the "invitation character," "demand character," "valence," and of course, "affordance." In their English version of Lewin's *Dynamic Theory of Personality* into English (1935), Adams and Zener used the word valence to translate *Aufforderungscharakter*: "A certain object or event . . . is experienced as an attraction (or repulsion) . . . We shall say of such objects that they possess a '*valence*'" (Lewin 1935, p. 51). According to the *Oxford English Dictionary*, valence comes from the Latin *valentia* meaning vigor, capacity, and strength. In its earliest recorded but now obsolete use, valence referred to an herbal elixir, "an extract or preparation used in medicine"; more recently, chemistry has used valence to denote the measurable capacity of atomic elements to attract or repel each other. Psychology, after Lewin's *Aufforderungscharakter,* also adopted valence as a technical term to denote an attractive or repulsive force attributable to an object or situation.

Tones, Melodies and Utterances

In terms of listening for invitational quality of things, it is worth noting the work of Estonian biologist Jakob von Uexküll (2010 [1934/1940]). For Uexküll, objects appear or show up as "functionally toned," shaded, or colored (*funktionale Tonung*) in the unique world of a creature. In the context of the human world, a cup can be said to have a "drinking tone," whereas a chair has a "sitting tone." The cup and chair are part of a contrapuntal melody of perception and movement that obtains between human beings and their lived world or *Umwelt*. The *Umwelt* of a creature is always already alive with such polyphonic melodies—a kind of call-and-response antiphony—emerging from the ongoing congress and play of living and nonliving material forces. As such, the *Umwelt* describes a unique field of entities and web of meaning relations that appear to a given creature depending on its perceptual and actional endowments. Uexküll's insights were tapped by early phenomenological philosophers like Heidegger and Merleau-Ponty, and more recently, by Ingold and posthumanist philosopher Andy Clark.

Media ecologist Marshall McLuhan evokes a similarly tonal or musical metaphor to describe a technology's unique "utterance" to its potential user. Technology, McLuhan tells us, is atmospheric and ecological. As we take up, learn to use, and habituate to a new technology, its unique melody silently disperses and permeates our world, releasing and setting in motion its intoxicating "utterance." He suggests that "the action of new technologies is only possible while the users are 'well adjusted'

[meaning] sound asleep" (McLuhan & McLuhan 1988, p. 127–128). In order for us sleepy users to discern a technology's medial "lines of force" (McLuhan 1964, p. 15) and its reverberating "vortex of side-effects" (McLuhan & McLuhan 1988, p. 128), we must find ways to "stand aside" (McLuhan 1964, p. 15) from it:

> For any medium has the power of imposing its own assumptions on the unwary. Prediction and control consist in avoiding this subliminal state of Narcissus trance. But the greatest aid to this end is simply in knowing that the spell can occur immediately upon contact, as in the first bars of a melody. (p. 15)

For McLuhan, every technology "is in fact a kind of word, a metaphor that translates experience from one form to another" (McLuhan & McLuhan 1998, p. 3). The "etymology" of a technology may always be traced back to the human body's perceptual and actional possibilities:

> All human artefacts are human utterances, or outerings, and as such they are linguistic and rhetorical entities. At the same time the etymology of all human technologies is to be found in the human body itself: they are, as it were, prosthetic devices, mutations, metaphors of the body or its parts. (McLuhan & McLuhan 1988, p. 128)

To utter is to speak, to say or pronounce a word, a phrase or a sentence. The *Oxford English Dictionary* reveals that the word "utter" comes from the Old English *ūttra* for "outer," thus McLuhan's penchant for also describing artifacts as "outerings." "Utter" also means to put into circulation; to send out, supply, or furnish; to disclose, or divulge (something unknown, secret, or hidden); to declare, reveal, or make known the character or identity of (a person or thing); to show. In uttering, a technology shows itself and divulges its character.

As a word or figure of speech, and more specifically as a metaphor, every technology carries or bears forth some form of change. It is a vehicle of translation and transformation. Rhetorician I. A. Richards (1936) tells us that metaphor "is the omnipresent principle of language" (p. 92), and that all metaphors declare "resemblances" (p. 89):

> In the simplest formulation, when we use a metaphor we have two thoughts of different things active together and supported by a single word, phrase, whose meaning is a resultant of their interaction. (p. 93)

A metaphor is composed of two inseparable "halves": the vehicle and the tenor. For example, in the metaphor, "teacher as midwife," midwife is the vehicle through which our understanding of teacher acquires a new tenor. Tenor is the "resembling" melody, the new tonal field of meaning evoked via the metaphorical pairing of and ensuing productive tensions and leaks between two otherwise dissimilar things. A new linguistic assemblage is convened, and along with it, a new ground of significances is unleashed as correlates are discovered and disconnections abandoned. A technology's utterance, then, involves in its simplest form, conjoined couplets such as human-technology, actor-network. Such hybrid concoctions, like the midwife-teacher metaphor, gather together "different things active together" (p. 93) into a single word or, as more provocatively described by McLuhan, an uttering. We will revisit technology as a word or tonal uttering in Heuristic 6 (Applying the Laws of Media).

Heuristic 4. Studying Breakdowns, Accidents, and Anomalies

Interview Questions

- What if a particular object breaks or is unexpectedly missing? What happens?
- In the wake of a breakdown, accident, or anomaly, what practices and things become more visible?
- What anomalies, incongruences, and inconsistencies are being played out? Are there any unintended or surprising consequences?
- What energies and forces were/are pressing the (broken) object to act? What frictions are evident?

When a technology is successfully integrated into practice, it withdraws into the taken-for-granted background of our everyday involvements (Heidegger 1962). Checking my e-mail on my smartphone, I pay little attention to the familiar blue and white envelope icon as I tap on it, and I certainly do not think about the device itself, its OS, the Wi-Fi connection and global networks that together assemble this communicative possibility. Instead, my focus is on whether I have any new messages and on reading them, not on the technology itself. The hardware, software,

and larger infrastructure supporting me are quietly sunk into my ready-to-hand, equipmental background.

When a technology breaks, acts unpredictably, or is unexpectedly absent, I suddenly wake up to its material presence (or absence), to the practices and activities it affords me, and to my reliance on it for the generally seamless, uninterrupted flow of my life. The electricity goes out, my car will not start, or my smartphone is misplaced. In the wake of such events, the broken or missing technology leaps out of the background and into the foreground of our attention. Our world may grind to an unexpected halt, our current projects disrupted or foiled. Breakdowns catch us unguarded in the midst of our taken-for-granted involvements with things. Yet, such events also afford the alert observer unique aperture into our ongoing, co-relational entanglements and tacit conversations with our material surround. For this reason, studying breakdowns, accidents, and anomalies—whether "naturally" occurring, induced, or imagined—is a common investigative practice among posthuman research approaches including ANT (e.g., Latour's (1996) *Aramis* project), media ecology (e.g., McLuhan, Hutcheon & McLuhan's (1977) *City as Classroom* project), phenomenology (e.g., Heidegger's (1962) hammer), and postphenomenology (e.g., Ihde's (1979, 1983, 1990) many fine analyses of technologies in use).

Latour (2005) writes that much of the ANT scholar's fieldwork is to multiply the occasions of momentary visibility of objects. For the phenomenologist too, "a 'breakdown' not only renders the thing in question visible, but it also lights up the relational web in which it is acting" (Olsen 2010, p. 73). As such, breakages, accidents, anomalies, and losses offer rich grounds for making the work of objects and the otherwise forgotten landscape of things thinging visible. Here, one can ask a human research participant (or oneself): Have you ever experienced a situation where (the technology of interest) did not work, or something unusual happened? What happened? What did you notice? In his analysis of a door, Latour remarks "every time you want to know what a nonhuman does, simply imagine what other humans or other nonhumans would have to do were this character not present" (1992, p. 229). These are all useful object interview questions.

For example, what if there was no delete button on our keyboards? Most of us would be quickly caught up in a tsunami of digital things, and overwhelmed by information overload. We may then inquire, what energies are pressing this object and its assemblage to act? As Thompson (2012a) suggests, if information saturation was not so omnipresent, the need for a

delete button would be far less pressing. If there was no need to remove, destroy, or hide online artifacts there would be no need for a delete button. Evoked by a rather innocuous button on a keyboard, deleting seems to be an integral part of online learning: as both a mundane and exotic practice. Provoked by the need for deleting, energies are directed toward data privacy, online identity management, persistence of digital entities, and a need for active management of online presence as one goes about their online activities. These kinds of interview questions help glimpse actors—sometimes distant—at work in the immediacy of practices of interest.

Michael (2000) comments that when intermediaries break down "we suddenly become aware of their mediating role: all the work . . . [and] arrangements that enable them to be ordinary, invisible, become spectacularly apparent" (p. 24). And so, some of the intimate alliances that knit people and things together in everyday practices may be revealed. But it is not only major breakdowns that can be revealing. Michael (2000) adds that "in the interstices of the everyday where mundane technologies quietly go about their business of sustaining normality, we find all manner of little 'abnormalities'" (p. 4).

In a recent research project on mobilities and mobile devices, Thompson (forthcoming) uncovered multiple examples of breakdowns, accidents, and little anomalies: each served as an entry point into making the sociomateriality of the researcher's data more visible. Let's take a look at one example. Certain devices held up as mobile—phones, tablet computers, laptops—are assumed to facilitate more and/or better forms of mobility. Some of the data in Thompson's (forthcoming) study clearly supports this claim. For instance, mobile devices are often used to pass the time while in motion, filling the gaps in physical mobilities. As Vincent, a software tester in Kenya, comments:

> My phone is mostly for Facebook, texting, and googling if there is nothing to do—I'm stuck in traffic on the bus and there is a problem I have to find a solution for. I use my phone because I don't want to bring out my Kindle or laptop in public.

Here, we glimpse a little anomaly. It seems there are times when some mobile assemblages need to be unobtrusive, fading into the background when needed. Vincent talks about reading his environment:

> I get on my Kindle when I'm on my way to work but coming home, if its late, I don't. When I go to the park I take out my Kindle or phone. Or a

> cybercafé—another secure place. Security comes first because I don't want to attract attention to my devices.

Vincent uses certain mobile devices only at certain times of the day in certain public spaces. What might this suggest to the researcher and what further interview questions could be posed? It seems here that a mobile device is rendered less mobile; somehow stopped in its movement toward mobility. More specifically, the making of mobile work-learning practices not only involves what is on the screen but also the screen itself. Are there other instances when mobile devices are not mobilizing much of anything? What other actors are complicit in immobilizing practices? Thompson (forthcoming) writes about how broken wireless cards confine a person to just one place; security concerns means mobile phones stay at home and are not ported around; no Wi-Fi or SIM card balance and the device, as Claire, CEO of a mobile applications start-up in Rwanda, states, "is totally useless" when on the move. But such immobilities are differently enacted in different assemblages and toggle back and forth with mobilities. For Dan, a Canadian adult educator, expensive data plans and absent Wi-Fi connections means he is not online when he is on the move. But this is a negotiated immobility:

> I bought the cheapest plan when I got this new phone so I don't have access to data. I don't need 100% access. I'm not willing to pay the exorbitant charges. I can't get online sitting on the bus but I don't need to be online there. I can manage.

The materiality of these anomalies highlights how both mobilities and immobilities sit in an uneasy but necessary tension. In the space created by these anomalies, it is possible to catch glimpses of other actors (e.g. data plans, security concerns, and screens) and practices (e.g. how the making of mobilities does not float independently of the making of spaces). There is more work going on here than evident at first glance. Ostensibly "mobile" work-learning practices are perhaps more enmeshed with a sense of locale than acknowledged in the anytime-anywhere rhetoric. Also more visible is how the making of spaces—online and physical—for work and learning is a highly fluid and provisional process. Catching glimpses of these kinds of practices is facilitated by the interview questions in this heuristic.

Tool (Ready-to-Hand) and Broken Tool (Present-at-Hand)

Paying close attention to what transpires when a technology breaks, malfunctions, or is missing is also core to one of phenomenology's favorite methods—the eidetic reduction or imaginative variation. The eidetic reduction recognizes that every phenomenon obtains its unique identity via its differences from other related phenomena; it is originally constituted and marked by what it is *not*. Heidegger's (1962) analysis of a broken hammer is an excellent example of this approach. In *Being and Time*, Heidegger (1962) shows that we human beings (Beings-in-the-World or *Daseins*) are always already tangled up in and engaged with the things or "equipment" of our worldly surround, that is, with what is near to us. This engagement or "concernful dealing" with nearby things is most ordinarily and primordially "ready-to-hand" (*zuhanden*).

> Equipment can genuinely show itself only in dealings cut to its own measure (hammering with a hammer, for example); but in such dealings an entity of this kind is not grasped thematically as an occurring Thing . . . The less we just stare at the hammer-Thing, and the more we seize hold of it and use it, the more primordial does our relationship become, and the more unveiledly is it encountered as that which it is—equipment. The hammering itself uncovers the specific "manipulability" ["Handlichkeit"] of a hammer . . . we call "readiness-to-hand" [*Zuhandenheit*]. (Heidegger 1962, p. 98)

Thus, we tend to encounter a thing not as an object as such, but as part of an ongoing and intimate rapport with our world. This ready-to-hand mode of primordial engagement is ontologically fundamental, that is, "proximally and for the most part Dasein is lost in its 'world'" (Heidegger 1962, p. 264).

Only when a "thing comes to be plucked out of its undifferentiated entanglement in its environment and exhibited" (Gunkel & Taylor 2014, p. 100) does it become "present-at-hand," that is, obvious as an object separate from us. How does this relational shift manifest? When I reach for my smartphone and discover it is completely dead, or it is missing, suddenly I become aware of it as a material object. As object, the smartphone shows up, phenomenologically speaking, as something distinct and other: "an 'object' is what gets in the way, a problem thrown in your path like a projectile" (Flusser 1999, p. 58). The present-at-hand object is conspicuous and obstinate, a thing temporarily torn from its equiprimordial relational context. Sylvia Benso (2000) describes things that appear to us as present-at-hand as

> [e]ntities that have lost their connections, their web of relations and references. No longer a place of intersections, they are taken in isolation, from *Dasein* and from other things.... Entities that disclose themselves as present-at-hand become still-life objects, entities deprived of the dynamism and vitality coming from the possibility of multiple intersections of references. (Benso 2000, p. 84, 85)

In sociomaterial discourse, this is when the actor is pulled from its network of associations and made visible or unblack-boxed. Eric Pickersgill's (2016) photographic collection, *Removed*, illustrates such a present-at-hand moment due to absence. In his photographs, human subjects are captured in the candidness of the quotidian—lying in bed, dining at a restaurant, driving through the city, standing at a corner—each intimately involved with their mobile phones. But in the photographs, the devices have been removed from the subjects' hands. The viewer is provoked to reflect on the comportment and devoted focus of each subject, on their relationship with others and to the world around them, and on the broader significances of this now ubiquitous technology.

As media ecologists McLuhan et al. (1978) point out, "The method of observing by suddenly removing a particular technology or *figure* draws attention to its side effects which are the *ground* of that *figure*" (p. 93, italics in original). The absent *figure* (mobile phone) makes the otherwise hidden and taken-for-granted *ground* (the medial web of relations that the mobile phone gathers). One reliable way to catalyze or experience this figure-ground shift is to remove the technology of interest from practice for a period of time and observe what transpires. For this reason, a favorite exercise in media classes is "unplugging" or abstaining from using specific technologies for 24 hours (see, e.g., Adams 2017; Moeller 2010).

In order to grasp a technology's technologizing influences and atmospheric intoxifications, we must be *in* it, that is, intimately involved with and immersed in using it. But when we are immersed, we are necessarily directly and immediately subject to and thus asleep to a technology's radiating web of effects. An unexpected technology breakdown or bodily injury can momentarily awaken the sleepy, prereflectively absorbed researcher or practitioner from her everyday and unreflective "naïve contact with the world" (Merleau-Ponty 2012, p. xx), or more precisely, from her artificially induced trance. Such wakeful jolts, while disconcerting, may also provide ideal occasion to

perform the reduction, that is, the attempt to restore a lived phenomenon to its originary form.

While investigating digital writing technologies, Adams fell and fractured a bone in her writing hand. In this instance, not the technology, but the human being broke! The accident ultimately proved to be an unexpectedly fortuitous occasion to study the contributions that different writing instruments and surfaces make to the practice of writing (Adams, 2016):

> I tried shifting the pen to my right (non-writing) hand, to sign a document that required my original signature, or to make a few napkin notes in the middle of a conversation. But I quickly discovered that writing with my right hand was awkward and laboriously slow; my penmanship was either illegible or appeared like that of a careful six-year-old child. Nonetheless, as I struggled to write, I was surprised at how my right hand seemed to "know" the shape and physiognomy of each letter it was striving to perform. Clearly, orthographic literacy inheres in ones whole body, but is most finely expressed through ones hands. . . .
>
> On a QWERTY keyboard, however, my otherwise "non-dominant" right hand participates as an equally skilled partner, commanding not only half the keyboard, but also the mouse or trackpad. With the occasional assistance of my hobbled but eager left-hand (by way of its pecking index finger), I soon found myself able to respond to emails at a speed remarkably close to the hybrid-hunt-and-peck speed I previously accomplished with two able hands (actually, three fingers and thumb from each). True, a couple of times my bulky cast bashed some unknown combination of keys, and sent my email response off prematurely. And then my husband arrived on the scene admonishing me, "What do you think you're doing?! You should be resting your hand, not plunking away on the keyboard!!" I was so involved with my writing that I had utterly forgotten my southpaw was injured.
>
> My hand, or rather hand*s* at the desktop computer (or laptop or iPad) keyboard *want* to write, and too, they want to write together. Rhythmic taps and clustered bursts of understanding live effortlessly between them. They have long since established a unique corpus of keystroke dances and jigs, as singular as my handwritten signature. Together my two hands' fingers patter out letters, words, and sentences, dividing their choreographic work seamlessly among themselves. The right hand, in command of the drop-down menus, tabs, toolbar and scroll, moves fluidly back and forth between mouse and keyboard. There is no question of encroaching on one another's space: my fingers and hands *are* the space. (pp.482–483)

Proceeding via this broken tool approach, a technology may be observed retrospectively in its most taken-for-granted, ready-to-hand moments. Whether studying an outright breakdown or puzzling over incongruencies in everyday actions, such events and anomalies provide ripe opportunities to witness digital and non-digital things in motion, intertwined with and caught up in everyday practices.

CHAPTER 3

Loosening the Meshwork, Analyzing Medialities and Materialities

Abstract We detail our second set of four heuristics for posthuman inquiry: discerning the spectrum of human-technology-world relations, applying the Laws of Media, unraveling translations and tracing responses and passages. The focus is on lifting the entangled digital thing of interest into relief, and then reflectively analyzing its medial relations and material contributions. Each of the heuristics engages a different theoretical framework, but each is aligned with posthumanism. Practical applications and examples follow.

Keywords Human-technology-world relations · laws of media · post-phenomenology · tetrad · translations

In the previous chapter, we explored ways to awaken ourselves from "technological somnambulism" (Winner 1986, p. 5), and to attune to the objects and things found in professional practices and everyday contexts. We are now in a position to shake loose some of the relational meshwork and equipmental surround and gently lift the entangled thing(s) of interest into relief. As Merleau-Ponty (2012) tells us, "we must—precisely in order to see the world and to grasp it as a paradox—rupture our familiarity with it, and this rupture can teach us nothing except the unmotivated springing forth of the world" (p. xxvii). This rupture involves slackening, but never severing "the intentional threads that connect us to the world" (p. xxvii) in order to see the world as it

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appears "prior to every return to ourselves" (p. xxx). Below, we present four more heuristics for interviewing objects. Each heuristic offers a different approach for reflecting on the medialities of specific technologies (i.e., the atmosphere or lived world they set in motion) and for analyzing the materialities of practice.

Heuristic 5: Discerning the Spectrum of Human-Technology-World Relations

Interview Questions

- What kinds of human-technology-world relations does this technology engage?
- Embodiment? Hermeneutic? Alterity? Background? Others?

In his postphenomenology of technics, Don Ihde (1990) shows that "technologies, by providing a framework for action . . . form intentionalities and inclinations within which use-patterns take dominant shape" (pp. 140–141). He uncovers three distinct types or variations of human-technology relations that structure and sway our worldly involvements. Ihde calls these focal relations embodiment, hermeneutic, and alterity. He also names a fourth non-focal relation: background. These human-technology relations lie on a continuum and often overlap. Embodiment relations pass through the hermeneutic and so on. As well, relational modes with a technology may vary significantly across time, circumstance and purpose. Nonetheless, discerning the characteristics of these basic relational variations is helpful in gaining a more critical grasp on how technologies mediate our perceptions, ways of knowing, and practical actions. Or as Ihde (1990) describes, how our lifeworld obtains new shapes and curves, meanings and trajectories.

Ihde's (1990) human-technology relational analyses are situated in phenomenology's notion of intentionality. Over phenomenology's history, intentionality has been reinterpreted, refined, and even abandoned. For Husserl, intentionality described the basic "directedness" structure of lived experience. Consciousness is always consciousness of or about something. Heidegger's (1962) notion of *Dasein*'s "comportment," along with Merleau-Ponty's (2012) noncognitive, "I can," intentionality contributed to an enriched and existentially revised understanding of intentionality, expanding its meaning to encompass our pre-predicative attachment to

and indissoluble unity with the world. Intentionality describes our meaning-drenched relational yoke to the world.

Ihde (1990) represents this primal intentional co-relation by hyphenating the human and its lifeworld as "Human-World," and recalls Heidegger's Being-in-the-World. The hyphen abbreviates two arrows. One arrow represents the directedness and connectedness of intentionality (Human→World), that is, our oriented, "natural attitude" toward the world. Attitude here means disposition, comportment, but also suggests being fitted, joined to, and aligned with. A second dashed arrow points backward, indicating how the Human-World relationship is reflexive: our worldly surround, as we saw in Heuristic 3 (Listening for the Invitational Quality of Things), talks (back) to us (Human←World). With this simple mathematical shorthand, however, it is important to keep in mind that intentionality is not a single thread, but a webby sphere of intimate relational connections to our lifeworld. What we have here is not determinism but "reciprocal penetration" (Canguilhem, 2001, p. 30). Into this phenomenological correlate of intentionality, Ihde then inserts "technology" (or in earlier works, "machine" [1979] or "medium" [1983]): human-technology-world. From this "between," medial, or interlocutor position, he explores how technology acts as mediator (i.e., mediating actor) variously affecting and infecting our actional and perceptual relations with our world.

Embodiment Relations

Our most primal relation with technology is embodiment. An embodiment relation convenes when a technological artifact becomes an extension of our corporeal self, and is thus "incorporated" as part of our bodily experience. Automobiles, pens, and smartphones all fall into this relational category. The automobile extends our feet, the pen our finger, the smartphone our voice (and our memory, etc.). Here, the technology acts as the medium or atmospheric surround *through* which we may amplify our perceptual senses and extend our bodily capabilities. Human-technology embodiment relations involve taking "the particular technology into my experiencing in a particular way by way of perceiving through the technology and through the reflexive transformation of my perceptual and body sense" (Ihde 1990, p. 72). Ihde expresses this relation as: (Human-Technology)→World. Human and technology are joined together, and through this intimate assemblage (coagency), the human (as human-technology) experiences their world anew.

This existential relationship is characterized by a sense of transparency. When being used, the technology "withdraws," and slips silently into the background. The world, not the technology, is the focus of the user's attention. As Merleau-Ponty (2012) describes:

> The blind man's cane has ceased to be an object for him, it is no longer perceived for itself; rather, the cane's furthest point is transformed into a sensitive zone, it increases the scope and the radius of the act of touching and has become analogous to a gaze. (p. 144).

To accomplish the semblance of transparency, we must become accustomed and habituated to the technology. Stepping into a car, for example, the *experienced* driver

> forms a unity with his car, that is to say his car becomes part of his body. . . . The driver is as wide as his car. He does not "measure" whether or not he can pass through a space, but "feels" it after a while. But he feels it only insofar and for as long as he sits behind the wheel. (van Lennep 1987, p. 143)

The new driver has no such relationship with his car. Time and practice are needed for the body to attain the many gestural habits of driving, while reckoning with the road and traffic situation. Once such habits are established and stabilized, the driver inhabits the car as much as the car inhabits the driver.

> To habituate oneself to . . . an automobile, or a cane is to take up residence in them, or inversely, to make them participate within the voluminosity of one's own body. Habit expresses the power we have of dilating our being in the world, or of altering our existence through incorporating new instruments. (Merleau-Ponty 2012, p. 145)

Phenomenologically, the driver can never fully incorporate the vehicle, since its materiality can never fully escape their perceptual notice. The driver with foot on the gas or brake, hands on the wheel, eyes on the road maintains both an "absolute proximity" to and simultaneously an "irremediable distance" (Merleau-Ponty 1968, p. 127) from their vehicle. Even in the midst of our most perfect embodiment relations with a technology, it remains always other. The technology resists full incorporation. This resistance produces what Ihde (1979) calls an "echo focus" (p. 7).

Hermeneutic Relations

Hermeneutic relations develop when the technology must be interpreted or "read" for meaning. I read a thermometer to know how cold it is outside. I read a map to figure out where I am, that is, I match my ground location with corresponding features on the map in order to chart a path from my current location to my destination. To use a piece of software such as PowerPoint, I must be able to read and interpret its specialized graphic environment, its icons, its menus and toolbar functions. To read a book, I must already know the English language, but more particularly, I must be able to read and interpret its alphabetic text on the page. To enter into a hermeneutic relation with a technology, I must thus learn its unique language and conventions: Celsius or Fahrenheit; latitude and longitude; icons, dropdown menus, ribbons, tabs and buttons; alphabets, spelling and grammar, etc. Ihde depicts the hermeneutic relation as: Human→(Technology-World). Via a hermeneutic relation, I apprehend and newly comprehend the world in a technology-textured or superimposed form: "the user experiences a transformed encounter with the world via the direct experience and interpretation of the technology itself" (Rosenberg & Verbeek 2015, p. 17). Hermeneutic relations develop intimate correspondences to and linkages between the world given by the technology and the world itself. The world as immediately perceived appears *translated* into the language given by the technology (it's warm out, it must be 30°C!). Our horizonal grasp is made intelligible in a new and expanded way.

Hermeneutic relations also involve varying degrees of embodiment relationships. In reading a book, for example, we are primarily engaged hermeneutically with the text. The book invites us to understand and interpret the world in a particular way. In picking up a book, our body orients to it, holds it open at a comfortable distance, perhaps propping it with our elbow against our knee or on a table, turns the pages, etc. (van Manen & Adams 2009). The materiality of the book withdraws, and is absorbed prereflectively in the cradle of our hands. Too, in order to use a piece of software, my hands must be intimately involved in an embodiment relation with the keyboard and mouse or trackpad (Adams, 2016). Driving a car is clearly an embodiment relation until we consider the complexity of the situation. Inside the car, the driver must variously monitor and read multiple hermeneutic devices including speedometer, gas gauge, and GPS (Global Positioning System). Outside, the driver must interpret the meaning of different road signs, changing traffic

lights, and even the signals (or lack of signals) given by other cars. Crucially, a hermeneutic relation scaffolds a particular framing of the world and thereby shapes our thinking habits and structures how knowledge is held. Creating a lesson in PowerPoint, I think in terms of slides, bullets, and images (Adams 2006). With map in hand, the city is given to me as a flat plane of streets, locations, and intersections. Reading the thermostat, my sense of ambient warmth is assigned a number.

Alterity Relations

Alterity relations occur when a technological artifact is experienced as "other." Such relations occur when a technology seems to have a mind of its own, does not obey our desire, or acts in an unexpected manner. In today's digital world, we increasingly find ourselves engaged in alterity relations with technologies, for example, with internet bots, avatars, and robots. Sometimes, we may not even realize that we are interacting with a bot rather than a person. Or perhaps we are simply not sure. Joseph Weizenbaum's (1966) ELIZA—a piece of software that simulated a conversation with a Rogerian psychotherapist—is a classic example of how software can quickly engage us in an alterity relation. This kind of relation may also be seen in the intimate bond a child develops with a favorite bedtime toy. Some adults have such "user attachment" relationships with their cars or their smartphones (Thorsteinsson & Page 2014), giving them special names, and perhaps speaking to or of them with affection. Ihde expresses alterity relations as: Human→Technology-(World).

Alterity relations are also at play when we are learning how to use a new technology. Such relations are often characterized by awkwardness, discordance, or difficulty. Using a new mobile phone, for example, my hands and fingers, habituated to an earlier version, now encounters an unfamiliar terrain. I cannot yet co-respond with it in a fitting way; I do not yet know its special language or the contours of its materiality. Until it becomes habit, the technology can neither withdraw existentially nor hermeneutically. Rather, I encounter it directly, face-to-face as other. Before I have learned how to use a new piece of software, for example, I struggle to master its possibilities, to reckon with its layout and iconic language, but too, to find ways to integrate it into my practice. I am not yet accustomed to its available functions. I cannot yet think in terms of its vocabularies. I have not yet developed an unencumbered rapport with its unique environment. It is still *other* than me. In a similar vein, an alterity

relation is also struck when a technology abruptly breaks (see Heuristic 4 Studying Breakdowns, Accidents, and Anomalies). In such moments, the technology with which we were enjoying a ready-to-hand, embodiment and/or hermeneutic relation suddenly becomes other that our expectation. It is now "conspicuous, obtrusive, or obstinate" (Gunkel & Taylor 2014, p. 109), that is, it abruptly turns into a present-at-hand object. The technology shows up, not as a seamless extension of myself or as interpretive support, but as unintelligible or other than me.

Background Relations

Finally, we humans enjoy "background relations" (Ihde 1990, pp. 156–159) with our technologies. A background relation describes our forgotten congress with the technologies that work transparently and unnoticed in the "disappeared," taken-for-granted background or lifeworld. Such technologies are part of our equipmental or infrastructural surround. Heating, electrical, and communication systems, as well as surveillance technologies, big data analytics, and the Internet of Things fall in this relational category. Background technologies and equipment perform their work primarily outside of our awareness, "forever in action, constructing in each moment the sustaining habitat where our explicit awareness is on the move" (Harman 2002, p. 18). In some respects, this relation could also be called a non–focal embodiment relation, since these relations all variously enhance and extend our perceptual and actional possibilities. Ihde expresses background relations as Human→(Technology/World). This equation once more denotes our fundamental, intentional relation to the world (being-in-the-world), but the world is now understood to be a "technology-textured world" (Ihde 1990, p. 163). Ivan Illich (1996) calls this "technosphere" (Ihde 1979, p. 14) *le milieu technique*, an all-encompassing technological embrace that silently and continuously shapes how we think, dwell, and act in the world.

Albert Borgmann (1984) observes that modern technologies like the furnace have relieved us of some of the "focal practices" that once gathered us as communities. In the wake of central heating, for example, the social practices that were once convened by families gathering around the fireplace or kitchen hearth have receded and disappeared. Borgmann uses the term "devices" to describe technologies like the furnace. Devices may not only disburden us of menial tasks (e.g., chopping and gathering wood), but they may also atrophy meaningful social ties. Background

relations may also be described as "interpassive," as opposed to the more interactive character that defines our focal relations to technologies: "I . . . merely adjust or start . . . the machinery which, once underway, does its own work" (Ihde 1979, p. 14). The Tibetan hand prayer wheel provides a classic example of an interpassive relation (Žižek 1998). The prayer wheel consists of a metal cylinder containing sacred texts that revolves on a handle. Setting the prayer wheel in motion, its user believes that prayers will be accomplished automatically. Interpassivity thus involves outsourcing our work to a device. The device takes over and becomes our surrogate or proxy for actions or decisions that were once our responsibility.

Van Oenen (2011) describes interpassivity as a post-emancipatory condition, arising in the shadow of interactivity, whereby objects acquire "actorship, by taking over our contribution from us" (p. 2). Drawing on Actor-Network Theory (ANT) and echoing Borgmann, van Oenen argues that we are increasingly outsourcing our emancipatory burden to interpassive objects that script and direct our actions. These interpassive objects are preloaded or "'charged,' with our 'outsourced' interactivity" (van Oenen 2011, p. 15). In such a situation, agency drifts. In today's classrooms, for example, teachers' disciplinary knowledge, once presented and represented at the hand of chalk and blackboard, pens and notebooks, books, and desks, is increasingly being distributed across broad and deep digital networks reaching well beyond the local enclave of the neighborhood school. In this respect, the interactive whiteboard (IWB) could also be described as an interpassive whiteboard, inasmuch as the board performs tasks on the teacher's behalf, such as showing a Youtube lesson on wheels and levers or running a simulation of population growth.

A Brief Example

Ihde's (1990) set of human-technology relations is neither exhaustive nor mutually exclusive. He is also not without his critics. Brey (2000) objects that Ihde's taxonomy fails to account for how human-technology relations are constituted. Verbeek (2008) suggests that Ihde has overlooked other important human-technology relations, such as "cyborg relations" that are constituted via bodily microchip implants or psychopharmaceuticals, for example, (human/technology)→world. Nonetheless, Ihde's categories may serve to alert us to the multiple ways that we engage technologies everyday, and provide us one approach to untangling their significance.

Consider, for example, a youth playing a first-person shooter (FPS) game. Several human-technology relations are necessarily engaged. To play the videogame, the gamer must build a *hermeneutic relation* with the FPS game, by learning its specialized vocabularies, its rules and game mechanics, its storylines and geographies. "A hermeneutic relation mimics sensory perception" (Ihde 1990, p. 85), but the perceptual focus is given by the technology itself, here via audiovisual projection. Playing the game, the gamer must be able to "read" the projected FPS gaming world, and they must also learn to act in terms of it. Hands and fingers on the game controller, headset projecting sound and voice, the player also takes up an *embodiment* relation with the game. The experienced player, deftly manipulating the controller buttons, moves and acts seamlessly in the context of the game environment, through the eyes and limbs of their avatar. FPS games try to simulate the experience of first-person point of view. In playing, the youth adopts this perspective as their own. *Alterity* relations may convene when the player is stuck on a level, for example. But more striking are the gamer's alterity relations with the other players or avatars. Whether other players are situated in the same room or across the globe, the gamer encounters each as an autonomous computer-generated avatar, as someone or something other. Finally, we may detect two modes of background relations. In the midst of gameplay, the gaming environment slips into the taken-for-granted background, a novel but non-focal technology-textured world. The player also takes up an interpassive or surrogate relation with their avatar, shifting their actional possibilities over to their screenic double.

Heuristic 6: Applying the "Laws of Media"

Interview Questions

- What does a technology enhance? What human capacity is extended, enhanced, or amplified when this technology is used?
- What does a technology render obsolete? What human capacity is diminished, attenuated, or simply forgotten when this technology is used?
- What does a technology retrieve from the past that was previously obsolesced?
- What does a technology reverse into when used ubiquitously or pressed to an extreme?
- What radiating "lines of force" does this technology put into play?

Media ecology, with roots in the work of Jacques Ellul, Elizabeth Eisenstein, Harold Innis, Marshall McLuhan, Walter Ong, and Neil Postman implicates technologies and their radiating "lines of force" (McLuhan 1964, p. 15) in the creation and transformation of societies and cultures. For media ecologists, every technology convenes a novel environment—a unique, atmospheric background of effects—called a medium.

> All media work us over completely. They are so pervasive in their personal, political, economic, aesthetic, psychological, moral, ethical, and social consequences that they leave no part of us untouched, unaffected, unaltered. The medium is the massage. Any understanding of social and cultural change is impossible without knowledge of the way media work as environments. (McLuhan & Fiore 1967, p. 26)

Every medium or *lived* technology is recognized as ecological. It dilates and contracts, infects and infuses human perception, action, and understanding, with potentially far-reaching implications and reverberations in our personal, social, cultural, and political lives.

This heuristic takes advantage of the some of the insights of media ecology via the work of McLuhan. McLuhan and his son Eric proposed that every technology obeys four "Laws of Media." They posed their laws—enhancement, obsolescence, retrieval, and reversal—as questions intended to reveal the totality of a given technology's medial effects on the larger sociocultural situation:

- What does [a technology] enhance or intensify?
- What does it render obsolete or displace?
- What does it retrieve that was previously obsolesced?
- What does it produce or become when pressed to an extreme? (McLuhan & McLuhan 1988, p. 7)

Each question aims to make visible the trajectories and tensional aspects between the current situation and the medial environment that a technology mobilizes. The focus is less on figure of the technology itself but on the larger environmental ground that it conditions and mediates as it is employed.

> The ground of any technology or artifact is both the situation that gives rise to it and the whole environment (medium) of services and disservices that

> bring it into play. These environmental side-effects impose themselves . . . as a new form of culture. (1988, p. 5)

Read together, the laws focus our attention on the dynamic "situations that are still in process, situations that are restructuring new perceptions and shaping new environments, even while they are restructuring old ones" (McLuhan & McLuhan 1988, p. 116). The McLuhans organize the *Laws of Media* as a tetrad to depict visually that a technology's trajectories or lines of force are not sequential, but *simultaneous* and *complementary*. In a brief essay published while he was working on the laws, McLuhan provides a short introduction:

> My current writing . . . concerns a study of the laws of media. (Perhaps it will be named "Phenomenology of the Media") . . . In each technology the question is asked, "What does it enhance?" and second, "What does it obsolesce?" and third, "What does it retrieve that had been eliminated much earlier?" and finally, "What does it flip into when pushed to its maximum potential?" It is easy to illustrate this from as immediate matter as money which enhances speed of transaction, obsolesces barter, retrieves potlatch (conspicuous consumption), and when pushed to its limit becomes credit. (McLuhan et al. 1978, p. 94)

McLuhan's brief "money" tetrad example is composed of practices (e.g., barter and potlatch or conspicuous consumption), changes in the quality of a practice (e.g., speed of transaction) as well as other forms of technology (e.g., credit). As a phenomenology of media, the laws also encompass Ihde's (1990) observation that every human-technology-world relation exhibits an amplification/reduction experiential structure. Importantly, the tetrad must exhibit tensional relationships between each of the four quadrants or laws.

The answers to the four laws of media questions may vary depending on the social and culture situation into which the technology is inducted much in the same way that a word's connotation varies depending on its context and usage. Recall that McLuhan describes every technology as a unique word or "utterance" (see Heuristic 3 Listening to the Invitational Quality of Things).

> Each of man's artefacts is in fact a kind of word, a metaphor that translates experience from one form to another . . . It makes no difference whatever whether one considers as artefacts or as media things of a tangible

> 'hardware' nature such as bowls and clubs or forks and spoons, or tools and devices and engines, railways, spacecraft, radios, computers, and so on; or things of a 'software' nature such as theories or laws of science, philosophical systems, remedies or oven diseases in medicine, forms or styles in painting or poetry or drama or music, and so on. All are equally artefacts, . . . all equally verbal in structure. *Laws of Media* provides the etymology and exegesis of these words: it may well turn out that the language they comprise has no syntax. So the accustomed distinctions between arts and sciences and between things and ideas, between physics and metaphysics, are dissolved. (McLuhan & McLuhan 1988, p. 3)

Thus, the tetrad intends to reveal a given technology's acoustic or vibratory ground, its etymological complex of connotative and denotative meanings, while dissolving traditional disciplinary boundaries. Like a new word being coined, a technology's medial effects begin to radiate as soon as it is invented. The McLuhans (1988) hoped that their laws would assist us in exercising some foresight in the coming maelstrom of effects and affects inevitably created by new media, and specifically electronic or digital technologies. In this respect, the Laws of Media are meant to sharpen the critical perceptions of today's technology users.

Enhancement

For the McLuhans, every technology involves an extension or enhancement of one or more of our bodily functions and/or cognitive capacities.

> *Enhancement* consists in intensifying some aspect of a situation, of extending a sense or configuration of senses, of turning an element of ground into figure, or of further intensifying something already figure. (McLuhan & McLuhan 1988, p. 227)

Such enhancements may mean an amplification, translation, intensification, or acceleration of a human faculty or ability. Indeed, unless technologies are able to do this work of enhancement, for example, by increasing our power or speed, "new extensions of ourselves would not occur or would be discarded" (McLuhan 1964, p. 91). In the context of the electronic age, McLuhan (1964) provocatively suggests the human being "is an organism that now wears its brain outside its skull and its nerves outside its hide" (p. 64).

This law of media, "What does [a technology] enhance or intensify?" is often the easiest to discover. GPS (Global Positioning System) technology,

for example, enhances our ability to navigate from "here" to anywhere else on earth. The mobile phone enhances our ability to be available at any time. While there is seldom a single enhancement, this analytic technique works best by honing in on what the given technology *uniquely* affords its user. As Harman (2009b) points out in his account of the McLuhans' tetrad, "An 'extension of man' is never a laughing matter, since it silently murders other possible worlds" (p. 110). The next and complementary law of media—obsolescence—tries to uncover what practices or technologies are attenuated, disposed of or eliminated in the new technology's wake.

Obsolescence

Every technology, in amplifying or enhancing a perceptual, actional, or cognitive possibility, simultaneously reduces or "obsolesces" another aspect of experience. Obsolescence describes, "the attendant 'closure' . . . when one area of experience is heightened or intensified, another is diminished or numbed" (McLuhan & McLuhan 1988, p. xx). Virtual reality technologies, like Oculus Rift and Vive, for example, enhance dramatically our perception of wholly novel environments, but simultaneously blind us to our surrounding world. With obsolescence "a former situation [is rendered] impotent by displacement: figure returns to ground" (McLuhan & McLuhan 1988, p. 227). This media ecological principle is built into the McLuhans' tetrad, and helps account for the utopian (hopeful) and the dystopian (anxious) claims that seem to erupt whenever a new technology arrives on the scene. The enhancement/obsolescence ratio also speaks to the posthuman refusal to take an either/or position. We are simultaneously augmented and diminished by the technical. Both trajectories must be accounted for.

In his phenomenological analyses of technics, Ihde similarly discovered that amplification and reduction is an invariant aspect of the experiential structure of all human-technology relations.

> The *reductive dimension* of a medium [acts] simultaneous with . . . [and is] inextricably bound to the *amplificatory dimension* (which is usually regarded positively) . . . It is together that this amplification-reduction makes a medium nonneutral or transformative of human experience. It is moreover, a feature of every technology. (Ihde 1983, p. 56, italics in original)

By way of example, Ihde describes a dentist's use of a sickle probe, the small metal rod with a pointed tip and intended to detect irregularities in a tooth that a finger alone could not sense:

> At the same time that the probe *extends and amplifies*, it *reduces* another dimension of the tooth experience. With my finger I sensed the warmth of the tooth, its wetness, etc., aspects which I did not get through the probe at all. The probe, precisely in giving me a finer discrimination related to the micro-features, "forgot" or reduced the full range of other features sensed with my finger's touch. (Ihde 1979, p. 21)

Thus, it is important to ask not only what a given technology enhances but also what it simultaneously reduces, diminishes, or obsolesces. Consider another example from the classroom: the calculator. What does a calculator amplify and extend? What does it reduce or obsolesce? A calculator amplifies or extends a student's ability to perform mathematical calculations. The student no longer needs to struggle to recall basic addition facts or times tables, nor the algorithms for performing various mathematical functions. The calculator "remembers" all these facts and methods. The student needs only to accurately communicate the mathematical problem to the calculator and press the Enter key. The student can get on with higher-level understandings without being caught in the drudgery of long division calculations or complex formulae.

At the same time, overstepping or transgressing the previous requirement to recall addition facts or multiplication tables, and the need to perform mathematical procedures such as long division by hand, certain numeracy skills begin to atrophy. When such skills are seldom practiced, they are reduced or weakened rather than enhanced or strengthened. Multiplication tables are slowly forgotten, and the trusty method of long division fades from memory. Of course, educators may decide that such abilities are now essentially obsolete, and thus are willing to allow such basic skills, like numeracy, to attenuate in service of others. Or if numeracy is still deemed to be an important skill, teachers may be more circumspect in their use of calculators.

Returning to our GPS example, what does this technology obsolesce? Folded road maps, a former staple of road trips, have fallen into disuse. Atlases are forgotten on the now dusty bookshelf. The bird's eye view given by a map and the practice of locating oneself in a cartography is consulted less. With GPS, I may relinquish this overview and instead focus

my attention solely on my destination. The system calculates the path—I need only follow the directions given.

Retrieval

Retrieval revives a past practice or tool that had previously been lost or fallen into obsolesce. The recuperated technique may have been accomplished historically by a primitive version of the current technology. While "retrieval always seems to provide the keynote or dominant mode of each tetrad," the McLuhans' point out that "it is often the most difficult of the four to discover" (1988, p. 228). Here, some familiarity with cultural histories can be invaluable, or at least a willingness to do some archaeological digging for possible candidates. However,

> [r]etrieval is not simply a matter of hauling the old thing back onto stage, holus-bolus. Some translation or metamorphosis is necessary to place it into relation to the new ground. . . . The old thing is brought up to date, as it were . . . Dis-covery, or uncovering, is a form of retrieval. (McLuhan & McLuhan 1988, p. 101, 103)

The McLuhans describe retrieval as "the process by which something long obsolete is pressed back into service, revivified, a dead disease now made safe; ground becomes figure through the new situation" (McLuhan & McLuhan 1988, p. 228). In the case of GPS, this technology revives the explorer navigating the world by way of a compass. With a compass, no map is strictly needed, only the direction one is going is required. Like GPS, the traveler with compass need not know one's current location to use it, only the directional orientation to one's destination.

Reversal

The final law of media states that "every form, pushed to the limit of its potential, reverses its characteristics" (McLuhan & McLuhan 1988, p. xx). For the reversal, one needs to explore extremes, and too, explore breakdowns and anomalies. For example, Adams (2006) drew on one of the *Columbia* Accident Investigation Board's findings to unearth one aspect of PowerPoint's reversal. The Board implicated NASA's (National Aeronautics and Space Administration) ubiquitous use of PowerPoint as a factor in the shuttle tragedy. NASA engineers had used PowerPoint to communicate crucial information to executive decision-makers. Their slideshow broke

complex information across multiple slides, each displaying points within points of significance through nested bullets. However, the most critical point ended up buried several levels deep, and thus its true import and meaning was overlooked. In PowerPoint, a bullet designates significance. But when everything is bulleted, significance can become lost in a sea of bulleted significance, rendering all information once more insignificant.

McLuhan and McLuhan (1988) point out that "the reversal aspect of the tetrad is succinctly exemplified in a maxim from information theory: data overload equals pattern recognition" (p. 107). Finding a technology's reversal involves discerning the overall pattern a technology enacts. As Borgmann (1984) put it, "the peril of technology lies not in this or that of its manifestations but in the pervasiveness and consistency of its pattern" (p. 208). In the case of GPS, we may reflect on occasional humorous stories, as well as on tragic events where a driver has trusted GPS directions despite their obvious incoherence with the current ground situation. We may also consider what happens when GPS fails in a wholly unfamiliar land. Stuck in the middle of nowhere, at best one can say is that "I am here," and yet that now means nothing. GPS reverses into being utterly lost.

Tetrad

Based on our analysis, we may sketch the following tetrad for GPS (Fig. 3.1). The McLuhans (1988) provide many such tetrads in their book, *Laws of Media*. In applying the laws, a researcher may find it instructive to study these and other examples. Importantly, the tetrad is not intended as an end in itself but rather a process of discovery and analysis. At its heart is the understanding that every technology hatches a unique medial environment, and the tetrad attempts to depict its punctive utterance: "The tetrad is exegesis on four levels, showing not the mythic but the logos-structure of each artefact, and giving its four 'parts' as metaphor, or word" (McLuhan & McLuhan 1988, p. 128).

This heuristic involves a careful rendering of the insights generated in the creation of the tetrad. For example, here is a phenomenological reflection on using GPS that integrates some of the tensional understandings discovered in the tetrad, and focusing primarily on the reversal:

> Traveling a new city using GPS, I pass over its places. The "where" of the city is lost on me—later I remember little of it, neither its contours nor its landmarks. Instead I move through and traverse a technologized landscape, the city as it has been expropriated, requisitioned, and overlaid by a

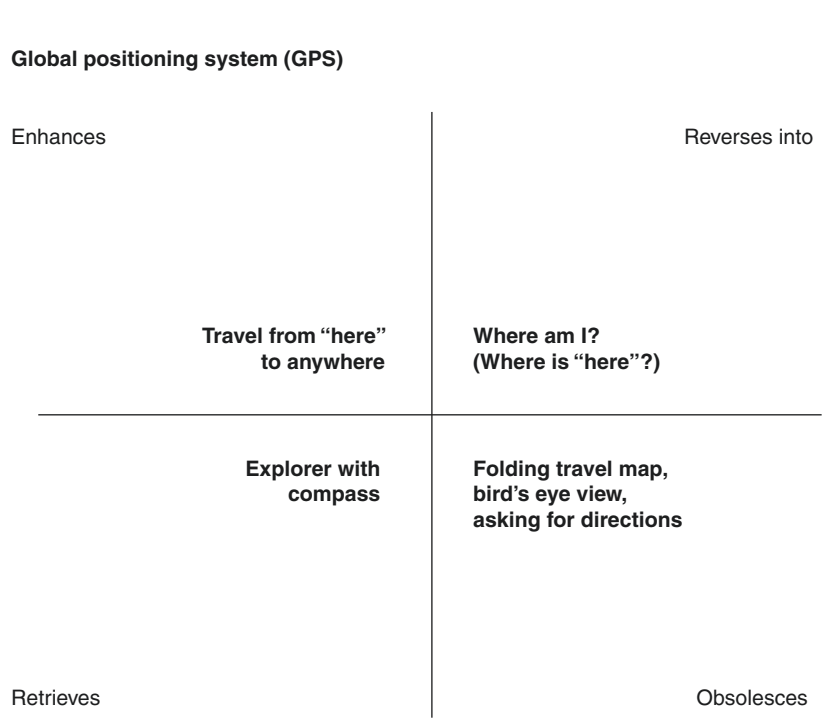

Fig. 3.1 GPS tetrad

digital veneer, thinned to mere positions and distances. The world is given to me as just-in-time directions to my final location. More accurately, I do not turn myself over entirely to the GPS. Rather, I am occupied double-checking and matching my surroundings to the directions given to me. I am not dwelling in the city, but flying through on the wings of the Global Positioning System, and apprehending the city in its mapped and digitized version. The "poignancy and plenitude" (Casey 2013, p. 342) of place is unmet and drifts away. Of course, I do get to where I intended to go In fairly short order! With GPS, I am neither lost, nor disoriented. Rather, I am oriented to my GPS, while remaining strangely unoriented to my locale. I have turned over my ground and entrusted my wayfinding to the digital. If, for whatever reason, the GPS gives out or does not guide me correctly, then I am suddenly thrown into the middle of things, *in medias res.* In this medias res, the magic GPS mediated-world is suddenly disappeared and I may find myself in a pickle indeed, as if I had just awoken from a dream, and

> have no bearings at all. Here we witness our dangerously blind trust in the digital to show us the way. In the intoxications of GPS, our grounding sense of place—the familiar nearness of home and the uncanny remoteness of the exotic—is being gently lifted, stolen away, and quietly replaced with the uniform distancelessness of a "you are here" positionality. (Adams 2017)

The McLuhans' fourfold laws "are a powerful utensil for analysing any . . . artefact one might wish to describe" (Harman 2009b, p. 116). Nonetheless, Harman (2009b) complains that the McLuhan's ontology confines "the tetrad and its figure/ground relationship to the sphere of human perception" (pp. 119–120) and thereby misses its possible extensions to inanimate matter. Indeed, the human-technology relation is taken as the basic unit of analysis in McLuhan's Laws of Media. The tetrad always depicts a specific human-nonhuman hybrid (i.e., an extension or "lived technology") as it is mobilized in the world, and aims to describe its gestural articulations and medial reverberations. As such, the laws of media serve in compiling a helpful dictionary of etymological roots, pronunciations, denotative "usages," and the unique connotative (associated) shades of individual technologies. Complicating interactions between other nonhumans are necessarily pushed momentarily aside to accomplish this singular glossary. To work out the multiple associations and dissociations that develop in local "word" usage contexts, Heuristic 7 (Unraveling Translations) and Heuristic 8 (Tracing Responses and Passages) may provide assistance.

Heuristic 7: Unraveling Translations

Interview Questions

- How have particular gatherings come to be and how do they maintain their connections? What work is happening as actors join up, stay linked, and/or break apart? What kinds of orderings and reorderings can be discerned?
- If a particular micro-practice seems stable, how did that stability come about? If it seems to be in a state of flux, what is keeping the micro-practice in this state? What is escaping? Overflowing? Where is controversy or dissidence happening?
- *Collateral Realities* (Law 2011): What unintended realities come into being as everyday practices unfold? What can be discerned about the gaps between practices and the realities they enact?

- *Multiple Assemblages* (Mol 2002): How do different sociomaterial worlds come to be? What objects and/or practices work to connect or distance these different worlds? How do these acts serve to join up or disrupt practices?
- *Politics*: What is entrenched? Who-what is excluded? What is made present? Absent? Are there any intruders? Do some actors seem more powerful or persuasive than others? If so, how is this happening?

In Heuristic 2 (Following the Actors), the emphasis is on following actors and untangling practices. Attention is given to how particular people, objects, ideas, discourses, and events come together in a particular practice and the work that gets done. How, for example, do mobile phones become entangled with buses, pdf documents, text messages, other people (close and distant), a range of screens, alerts, and wireless connectivity and the work-learning practices that emerge from these juxtapositions? Following the actors asks questions about what is "related" to what and how. For example, how does a note-taking app on a mobile phone come to be connected to the practice of generating ideas in the moment. Or how is a mobile device easily rendered immobile (or immobilize other actors) because of the absence of specific actors (e.g., a 0 credit balance on a SIM card). As the sociality and materiality around an object is traced, glimpses may be had into how a particular gathering of human and nonhuman actors has come to be, as well as what is happening as these actors inter-act. By following the actors, the researcher comes to see an array of practices that are being performed. These performances are not just the ones happening now. Latour (2005) suggests that any actor-network is a labyrinth of multiple relations that include actors from other places and times. Such temporal sensibilities suggest that practices currently performed may evoke both past doings and future imaginings, translating what has come before and translating what might unfold next.

Along with the other heuristics in Chapter 2, the focus on attending to objects and attuning to things has enabled various materialities of practice and objects of interest to surface. Drawing on the ANT concept of translation, Heuristic 7 further unravels the menagerie of actors and asks: How has this collection of actors come to be assembled? What contortions and invitations have helped to assemble this assemblage? Now there is an opportunity to venture into more political questions about the current collection of actors: What actors and practices have

become entrenched? Who-what is made present or is absent? What is intruding or escaping? Do some actors seem more powerful or persuasive than others? If so, how did this come to be and how do they enroll other actors? Unraveling translations enables the critical inquirer to examine if there might be multiple assemblages—or realities—at work and if any of the practices described could be assembled differently.

It is through the processes of translation that entities interface with others, transform, become linked, or decoupled. Translation is a potent ANT concept that can help researchers further examine how actors interact and how gatherings of actors in any practice assemble, willingly, under coercion or unknowingly. In early work, Callon (1986) referred to the "sociology of translation" as a "new approach to the study of power" (p. 196). Translation is the mechanism by which some entities come to control others, the way actors come to be "defined, associated, and simultaneously obliged to remain faithful to their alliances", and the way a few actors come to speak for others (p. 224).

We turn to data drawn from the mobile technologies study mentioned earlier in which the indispensability of the mobile devices in everyday work-learning practices was evident. Workers were entangled with multiple mobile devices in multiple assemblages, often overlapping, and at times conflicting (Thompson, forthcoming). We can start by asking how have such assemblages come to be and what work is going on to keep these assemblages in motion? One entry point is attuning to how the mobile device market represents multibillion-dollar industries which offer entertainment, communication, education, personal management, and security (Wilson 2014) and are implicated in new social, geographical, economic, and political imaginings of mobility. These commercial actors work hard to promulgate the pervasive rhetoric of continuous connectivity and the feeling that one cannot exist without mobile devices (Wilson 2014). These messages position mobility as generating the right flows of connectivity with others and ideas as needed.

Using the translation heuristic, we can probe *how* these flows of connectivity are generated. Consider the way mobile devices align with other actors such as note-taking apps that record, store, and recall or Internet access in short bursts at exactly the right moment. This alignment of actors means that Makori, an ICT (Information and Communication Technology) consultant in Kenya, can work through his "hot ideas" that he does not want to lose before he has a chance to develop them on his laptop. His ever-present mobile phone offers all sorts of invitations for

"in-the-moment" thinking, as well as the ability to later recall those ideas. Here, mobile devices urge on the momentum of a thought process: simplifying interactions with other digital objects at just the right time and in just the right place (Thompson, forthcoming).

These changes to practices are one kind of translation that seem to make work learning better, easier, and more convenient. Heuristic 7 also encourages the critical inquirer to examine the orderings and reorderings that can be glimpsed in such changes. Human actors are invited to identify with mobile devices in particular ways and to engage in specific actions. Claire, the CEO of a mobile applications start-up in Rwanda, asserts that her mobile devices have simplified her life: "When I started my company I had to have my backpack with my computer just so I could have all the information I needed for a meeting. Now I just carry my iPad and my phone." Rather than being stuck on a bus with limited space for a laptop, mobile devices offer the possibility of travelling light. Such a scenario make it easy to be enticed by the invitation of the portable, yet powerful, tablet computer. These are glimpses into how everyday expectations around connectivity and convenience are changing. The work of translation becomes evident as particular activities gain prominence.

Many of the mobile devices in this study—and their digital entourages—seem to act "as a unit of force" (Callon 1986 p. 216). Bundling of actors is another dimension of translation. Mobile hotspots, e-books, Bluetooth, server farms, keyboards, and batteries are assembled into a network of relations that keep these actors bound together. Even so, immobilities abound. Things escape. Assemblages are not as tightly knit as one might assume. Broken wireless cards confine a person to just one place; security concerns mean mobile phones stay at home and are not carried around. If you do not have a Wi-Fi or SIM card balance then the mobile device, as Claire states, 'is totally useless' when on the move. Callon (1986) describes the relational disconnects as "dissidence: betrayals and controversies" (p. 219).

Despite these betrayals, the critical mass of mobile device usage keeps these practices on the rails. Keeping these devices front-and-center in one's work-learning practices are moves such as the "m"-ing of many services (m-learning, m-retailing, m-government, and so on) supported by the abundance of apps especially for mobile devices. The dizzying array of screen sizes (laptops, tablets, phones, and phablets) makes it possible to find the right configuration. This is all part of the work of translation.

The indispensability of mobile devices in the work-learning practices described in this study is a result of many translations. By unravelling these translations, the critical inquirer can begin to see how material changes in practices have come to be accepted as the way things are done, how particular practices now stabilized and how future imaginings are curtailed—or not.

Stability is often an illusion. Any coherent bundling of actors requires hard work to keep the configurations intact, in part by thwarting attempts for competing practices to take hold. Interview questions may now focus on the most powerful actors. In this study, powerful actors included those digital devices with a particular array of features and accessories, ease of use, fit with other actors, and perhaps most importantly, being at hand exactly when needed. When Claire's iPad is aligned with PowerPoint slides, podcasts, e-books, note-taking apps, and Wi-Fi networks it seems to work anywhere. Her tablet is a powerful actor because of its ability to enroll (and be enrolled by) others, digital or otherwise (Thompson, forthcoming). Claire's iPad has become a powerful actor by replacing her iPod and e-reader and taking on some of the tasks previously performed by her laptop and phone.

Callon (1986) tells us that "to translate is to displace" (p. 223), but it is also about reassembling. Translation describes the ongoing negotiations that unify actors played against displacements and transformations that change and disrupt actors, relations, and the effects of the actor-network (Callon 1986). Using the notion of translation shifts the focus away from following the actors and instead probes the choreography of a particular practice: how it came to be this way, what is present/absent, how it is being held together, what it might become in the future, and who-what the powerful actors are and the alliances they have entered.

How an object transforms (or is translated through a series of displacements) is illustrated in the work of Tobias Röhl (2015) who followed geometrical prisms and model airplanes used in geometry classes, objects he refers to as didactic artifacts—devices and objects used for curricular purposes. Röhl (2015) argues that these artifacts do not merely shuttle from one locale to the next and then magically fulfill their role as educational objects when they appear in schools. In between the factory and the classroom, the objects are transformed by efforts of various actors in several intermediate sites (p. 152). Röhl (2015) traced how these objects were translated as they moved from the manufacturer, through commercial marketing venues into the storage room in the

school, and finally used in the classroom. At each stop, the object underwent a transformation. In the design stage it was an engineering problem, positioned as a desired economic good in the marketing stage, part of a collection ordered according to the curriculum in the storage room in the school. When finally introduced into the classroom it was an educational object embodying the knowledge of a discipline (p. 156). Of significance is how these translations highlight what Röhl (2015) calls a *transsituative* view of educational practices: "a nexus of practices conducted at various sites but connected to each other via mediating material objects" (p. 143). Following material objects enabled Röhl (2015) to make the work distributed across different sites and actors more visible, specifically the work needed to transform prisms and model airplanes into objects suited for use in a classroom.

In early ANT investigations, Callon (1986) proposed that translation is achieved through four "moments": problematization, interessement, enrolment, and mobilization. This framing has guided many insightful ANT analyses, including Hamilton's (2011) study of an educational policy reform initiative and Zukas and Kilminster's (2014) study of the learning enacted in work transitions of junior doctors. Callon (1986) acknowledges that these moments are never entirely distinct, and that movement through all four is necessary for a project to be successful. Callon's work has provided a rich framework but one can use the notion of translation without working lockstep through these four moments. Although these four moments are still evoked to help unpick practices, recent work also takes up the notion of translation to explore complex questions around the stability and fluidity of practices, with particular attention given to more problematic notions of hierarchy, power, politics, and things that escape and/or are excluded.

Heuristic 7 draws on a range of concepts to enable the researcher to come at translation in many ways including Law's (2011) "collateral realities", multiple sociomaterial worlds, and the politics of assemblages. Posing one of the interview questions will likely lead to other related questions as it is not merely a matter of working ones way down the bullet list. For example, although the original focus may be on how social and material relations are changing within a particular practice, what may become apparent is that there are actually many networks of actors of interest. As Annemarie Mol (2010) observes, most ANT researchers now attend to the tensions in coexisting networks rather than attempting to unravel singular networks (p. 260). Analyzing one assemblage of actors,

the presence of multiple assemblages and realities may become evident. Questions can then be posed to figure out what particular objects and/or practices are doing that serve to connect or separate these different worlds, and how this work joins up or disrupts practices.

In Fenwick's (2014a) study of different forms of knowledge in interpara/professional work, ANT heuristics were used to trace how knowledge circulates across an emergency mental health care context which includes an array of practitioners: paramedics, police, hospital admissions staff, psychiatric nurses, and consultants. Here, the emphasis is not on how a particular object is translated *per se*. Instead, the focus is on how things, practices, and people do not always move easily between the different sociomaterial worlds of paramedics, police, and the hospital. A vivid picture of multiple entangled networks emerges:

> The apparatus of the paramedics and police clearly distinguishes two different worlds, organised around different purposes and practices: the ambulance outfitted with medical equipment, assessment devices and cots focused on clinical diagnosis and medical care, and the police van equipped with flashing lights and sirens, handcuffs and breath analysers, for crime response and public safety. . . . In contrast . . . material practices in the hospital contain, order and control the encounter: the charge nurse labelling the situation, the waiting room, the curtained treatment cubicle, the standardised assessment protocols and diagnostic language. (Fenwick 2014a, p. 276)

In tracing movements between the different sociomaterial worlds in which paramedics are entangled, what emerges are several striking examples of failed attempts at translation: objects and practices that fail to enroll—or fail to be enrolled by—other actors. Fenwick's (2014a) analysis highlights how the objects created in these different material worlds have differing influence. For example, the paramedic's reports were not usually read in the handover to hospital and so were marginalized. The rich circulations of the "prehospital" knowledges often stopped at the admissions desk. She concludes that the knowledges circulating among the hospital assemblages—assessment forms, handover protocols, staff psychiatric knowledge and vocabulary, patient histories, etc.—appear to be contained within its own material boundaries (p. 277).

Another avenue for examining translations is Law's (2011) notion of collateral realities, that is, those realities that are produced incidentally and usually unintentionally through everyday practices. Law (2011) argues that by looking for "the gaps, the aporias, and the tensions between the

practices and their realities" (p. 171), differences can be discovered. Analytic questions to ask here include: What realities are getting done incidentally as everyday practices unfold? What gaps between practices and the realities they enact can be discerned?

In Thompson's (forthcoming) mobilities study, one collateral reality that emerged was the work needed in order not to get lost in the commotion, contradictions, and confusion between mobile devices. Considerable energy was spent addressing practical things like handling back-ups, what information was kept on which device, having the right amount of redundancy between devices, figuring out how to use each new technology, and helping to coordinate how one device "talked" to the others. These practices of choreography and negotiation were largely invisible and rather mundane. Such work was often unnoticed and perhaps perceived as unremarkable, accepted as what had to be done, and treated as overhead on top of other work—simply part of working, learning, playing and living online.

The interview questions in this heuristic take on a political edge: Who-what is made present or absent in various assemblages? How do the powerful actors operate? Drawing on the overtly political nature of this heuristic helps to make practices, actors, capabilities, and tensions visible in a way that enables a more critical questioning of the politics of such assemblages. How sociomaterial relations both smooth and complicate practices of interest enables critical inquirers to keep Latour's (2005) "matters of concern" open. Bringing the material nature of relations into view enables them to be interrogated. Mol (1999) uses the term "ontological politics" to assert that "the conditions of possibility are not given" and to draw attention to the politics that underline the active shapings going on as various performances are enacted (p. 75). Law (2009) contends that practices are assemblages of relations that *do* or create realities. Since realities are done in particular ways, the implication—the ontological politics—is that they could be assembled differently.

Heuristic 8: Tracing Responses and Passages

Interview Questions

- *Co-responding*: How do human actors join with the things around them in co-response to what is happening around them? (Ingold 2012b)

- *Improvising Passages*: What kinds of passages are being improvised as entities thread their way through the ways of others (human and material)? (Ingold 2012a)
- *Meshworking*: What lines of movement can be seen? What kind of knot-making (a temporary bringing together of human-technology energies) is going on? How are lines of movement (or becomings) being redirected? When do they loosen or tighten the knot? (Ingold 2012a)

Posthuman scholarship emphasizes the inseparability of human and nonhuman in the performance of practice and the fluidity of objects. Ingold (2012b) explains that practitioners do not merely interact with their materials but rather co-respond with them: "In the act of production, the artisan couples his own movements and gestures—indeed, his very life—with the becoming of his materials, joining with them and following the forces and flows that bring his work to fruition" (p. 435). When analyzing data, the interview questions in this heuristic probe how human actors and things join together in a co-respondence.

In Thompson's (forthcoming) mobilities study, co-responding with one's materials becomes evident in the way workers coupled the movement of their learning and work with the forces and flows of mobile devices. For example, as a consultant co-responding with his mobile phone, Makori can keep his ideas close at hand. The phone can go everywhere with him. He can download a myriad of apps which enable him to do the things he needs to do and the phone gives him the freedom to work outside the confines of his office. It is through activities such as these that particular work practices come to be. But it is not only practices that *become*. Material things also become through such movements and gestures. Makori's phone *becomes* a mobile device because of these activities, a process that is not guaranteed or stable. A mobile phone brings forces and flows of dependencies and vulnerabilities. It is only as useful as its apps and power supply. It can be lost or damaged. Like many digital technologies today, obsolescence is just around the corner. Indeed, once Makori sees a new and affordable version with the "scribble" feature he says he will be onto the next device.

Ingold's work presses our thinking beyond perceiving an object as a stand-alone, static entity. Rather, an object becomes, and it becomes when in motion. It becomes because of all the other things it is connected to (including humans) and the nature of those connections and flows of

activity. Careful reading of the interview and observational data in this study offers several illustrations of how a mobile phone can be a phone as well as a wireless hotspot, an accessory needing to be dressed up with skins and charms, a dictionary, a trusted personal guide, or a possession that you worry about losing. These various activities describe what a mobile phone is *doing*. As the researcher acknowledges these gestures, a range of possible forces and flows becomes visible. Co-responses can then be analyzed in an effort to understand who-what is becoming and how.

Drawing on Ingold's work means thinking about flows, forces, and movements as things and people intersect. Applying this analytic heuristic can show how multiple forces in the mobilities study, for example, make the achievement of mobile work-learning practices a rather remarkable feat rather than a given affordance of any one device. Mobile practices cannot be ascribed to devices, however powerful, and instead implicate a network of actors. In this sort of analysis, the researcher is encouraged to consider how the movements and gestures of human and nonhuman actors become entangled and become something together (or not).

Ingold's (2012b) notion of co-response becomes far more complicated—and perhaps limiting—when considering the complexity of the movements and gestures required to co-respond with an array of materialities, often simultaneously. Here, focusing on multiple sociomaterial enactments is useful (as emphasized in Heuristic 7 Unraveling Translations). Ingold's (2012a) meshwork or "an entanglement of interwoven lines" may also be a helpful analytic concept in teasing out some of the numerous forces and flows that may be evident in the data (p. 49). Ingold (2005) has argued that instead of a network of interconnected dots, "the lines of the meshwork . . . are the trails along which life is lived. And it is in the entanglement of lines, not in the connecting of points, that the mesh is constituted" (p. 47). He suggests in later work that the lines of the meshwork are the lines along which things *become* (Ingold 2012a).

This is an important shift. Anusas and Ingold (2013) argue that it is important to move beyond "the networked assembly of discrete objects" and instead consider the "entangled mesh of materials in energetic movements, out of which the forms of things are continually emerging" (p. 66). A mobile phone on its own does not make things or practices mobile. Achieving mobile work-learning practices is not just connecting up devices, just as expensive data plans do not necessarily shut down

capabilities to work on the move. It is important for the inquirer to attune to an assortment of moving lines and how these may intertwine: a form meshworking. Things are relational. They are what they are and do what they do because of the meshy web of relations in which they are entangled. As Ingold (2012b) suggests, things are continually becoming. They are lines of movement.

Attending to various movements and gestures performed by things and people through the lens of co-response helps to illuminate how entities and practices come to be and, in the process, how things and people become in these practices. Another way to think through the movements of people and things is Ingold's (2012a) notion of improvising passages. Ingold (2012a) writes that as beings thread their way through and among the ways of others (human and material), they must "improvise a passage" (p. 49). Each new passage lays a new line in the meshwork. At this point, interview questions that can be asked include: How do practitioners thread their way through the digital technologies (or other things/people/entities) in their work or learning space? As they do so, what passages are they improvising? For example, Makori shares:

> I have a desktop computer, a laptop, and the phone. I don't use the desktop; it just sits in my office. I always carry my phone. My laptop is only if I'm working in a work environment. I designate certain devices as the authoritative source for specific information. So for telephone calls and numbers, my phone is the authoritative source. Although I have several contact lists, the source of that information is the phone. For email, even if it comes through the phone I never download it there, only read. I download emails on my laptop so that is the authoritative source. The laptop is also now the backup, which I do at the end of every day. I will synchronize with the laptop. (Thompson, forthcoming)

This data snippet illustrates ongoing negotiations between digital things and human actors, which includes figuring out which device to use for what. This and other data begin to surface how other digital actors or people are needed in order to work on the move, to ensure tasks travel or that knowledge moves. These negotiations reflect the work going into the improvisation of different passages. Each contributes to the development of new practices.

A meshwork is comprised not only of lines but also of knots. Ingold (2012a) suggests that "knots are places where many lines of becoming are drawn tightly together" (p. 49). Such knots might be a temporary

bringing together of different human-technology gestures or attempts to lash these energies together into a more permanent practice. Lines, however, do not simply end in a bunch of knots. For example, mobile practices do not end with a mobile phone or Wi-Fi connection or e-book. These lines (or becomings) shoot out and curve around, often overtaking the knot (Ingold 2012a). Lines are therefore, not neatly wrapped up and constrained, but rather end "somewhere beyond the knot" (Ingold 2012a, p. 49). Here, the contingency of knotting becomes apparent. The idea that these lines continue to cast about for an entanglement with other lines (Ingold 2012a) helps explain why it is difficult to neatly contain the energies of digital things. Digital things do not always *become* in the same way. It also explains why the choreographies (or improvised passages) between human actors and digital things of all kinds entail complex and provisional negotiations. Movements beyond the knot may end up tugging at it and loosening it or tightening it further.

Human and nonhuman entities often attempt to stabilize fluid digital practices. This might be part of the work of improvising a passage. It is possible that movements beyond the knot end up working themselves back into the knot, tying a double knot, so to speak. Here there are more analytic questions to be posed: What kind of knot-making is going on? How is this happening? How are lines of movement being redirected? Constrained? Amplified? Such questions recall Heuristic 6 (Applying the Laws of Media).

Practices that order relations between actors also reflect a degree of knot-making. Such practices include settling into a routine, even if it is tentative and contingent on the arrival of the next new device, work task, problem, or a technology glitch such as dropped internet connections, data plan limits, or bandwidth restrictions. Having figured out what works (for now) there is a sense of wanting to be able to re-travel the route. Turkle (2008) points to the emotional security that is achieved with the "constancy of a stable technological environment and the interactive objects within it" (p. 133). In Thompson's mobilities study, Makori was under pressure from friends to buy an iPad. He explained that the iPad did not fit into the complex choreography he—and mesh of other digital actors—had already worked out between his phone and laptop: "It doesn't fit. It does not work with my phone or the laptop and would just become a point of conflict." Makori's dilemma illustrates the presence of a set of practices that have already been figured out, seem to work, and are not receptive to disruption by an iPad. In this study,

knot-making reflects attempts to slow down movements, redirect them, or even defer them.

In Chapters 2 and 3, we introduced eight heuristics that may support researchers' and practitioners' efforts to examine the things and materials of everyday and professional practices more critically. In Chapter 4, we turn our attention to research practice itself. We employ our heuristics to interview a few of the digital things found in contemporary qualitative researchers' toolboxes and reflect on their implications for contemporary and future knowledge generation and research practices.

CHAPTER 4

Interviewing Objects as Co-researchers

Abstract We employ our heuristics to interrogate the networked, digital landscape of contemporary qualitative research practices. We interview NVivo (a qualitative data analysis software package) and an iPod that were recruited at different stages of research projects. We suggest that these digital entities or "coded materialities" participate as co-researchers that not only transform, extend, and support but also deform, disrupt, and circumscribe research practice and knowledge construction, and inevitably introduce new tensions and contradictions. We take a brief foray into the doings of digital data in research practices, using visualization software as an example.

Keywords Digital data · interviewing objects · NVivo · qualitative data analysis (QDA) software

Consider the variety of digital tools a qualitative researcher may use to conduct a research project today—from conceptualizing the study to mobilizing results. Reviewing the literature, the researcher queries Google Scholar and academic databases, and employs EndNote, RefWorks, or other reference management software to track and organize found citations. She composes her research proposal in MS Word. This and other related documents are uploaded to a folder in Dropbox. Or perhaps, she enlists Google Docs to ease document sharing and collaboration with other team members. Research meetings are arranged with Doodle, which are

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subsequently conducted via Skype or other web-based conferencing tools. Mobile devices such as video cameras and iPods may be purchased to record interviews and support fieldwork. A research assistant may be asked to try out Audio Notetaker or Express Scribe to facilitate interview transcription. A qualitative data analysis (QDA) software program, such as NVivo or ATLAS.ti, is installed to assist with managing data and its analysis. Encryption software is employed to protect confidential digitized data. Depending on the project, she may experiment with data visualization or data mining software. The researcher uses PowerPoint to prepare her conference presentations; she uploads her word processed manuscript to an online journal system for peer review; she engages Twitter, Academia.edu, and other social media to mobilize her research findings.

The range of digital technologies being used in qualitative inquiry is now so extensive, whole textbooks are devoted to their use and application. Meanwhile, new questions are arising in the wake of this digitally intensified research landscape. A special issue of *Theory, Culture & Society* in May 2013 focused on the "social life of methods", and the UK's National Centre for Research Methods (NCRM) funded a series of workshops in 2012–2013 to debate "the opportunities and challenges that digitally inspired methods present for social research" (Roberts et al. 2013, p. 3). One of the concerns identified in the NCRM summary report was the black boxing of digital tools, leading to a lack of critical engagement and attention to methodological implications, despite the identification of significant ethical questions and reported challenges posed by the presence and use of these actors (p. 6). Drawing on the work of Scott Lash, David Beer (2012) predicts that software will increasingly be "streamlining, making efficient, predicting, making decisions for us, doing work on our behalf, taking some of the agency from researchers and the research process and making it their own" (para 2). Higher education is also undergoing massive upheaval and revision as its teaching and research practices are becoming more thoroughly intertwined with and defined by sophisticated algorithms.

In their introduction to *Digital Tools for Qualitative Research*, Paulus et al. (2014) encourage researchers to be circumspect in the use of digital technologies across all aspects of the research process—from managing projects and conducting literature reviews to the generation of data and its analysis. They propose adopting J. J. Gibson's and Don Norman's theory of affordances as a way to "consider the affordances and constraints of the tools we introduce . . . as part of engaging in reflexive practice" (p. 5). In

their final chapter, they reiterate their position that "as our social interactions are increasingly intertwined with digital technologies, it becomes ever more important to attend to the digital layer of the human experience in our explorations of social life" (p. 190). We agree. Unfortunately, Paulus et al. (2014) do not provide the promised "reflexive" attention to the tools researchers use, and employ only superficially the one heuristic they have on offer: affordance theory. More importantly, they make no reference to the co-constitutive nature of our relationship to digital tools in the performance of qualitative research practice. Instead, they confidently assert that "whether software is used or not, the researcher remains in charge of decisions around how to handle, analyse and interpret data" (p. 116). Situating the researcher as the sole arbiter in how a research project ultimately unfolds, while superficially correct, overlooks entirely the many subtle, but sometimes profound knowledge and practice implications at stake in digital technology integration.

In this chapter, we examine the digital landscape of qualitative research by unraveling examples from recent empirical studies. We suggest that the devices and software recruited for these projects acted as assistants or *co-researchers*. Their participation was far from neutral: while extending and supporting the research efforts of the researchers, the digital also introduced new activities and discourses, as well as unexpected tensions and contradictions. Drawing on some of the heuristics introduced in Chapters 2 and 3, we interview two digital things: (1) NVivo, a QDA software program, being used for a phenomenological research project, and (2) an iPod employed for field research. We chose these two digital things because both are popular and, to some degree, mundane objects in research practices. Both tend to float in the background of research reports and yet both are implicated in data collection and analysis efforts. While NVivo was specifically designed with research practices in mind, the iPod and other personal mobile devices have been co-opted by some researchers because of their ubiquity and functionality.

Through our object interviews, we attempt to better understand how digital things (along with other actors) inform but also deform, conform, or transform practice. We are also interested in data: what it is, and becomes, over the course of a research project, and how researchers (and other humans and nonhumans) become entangled with it. We therefore take a brief foray into the doings of digital data in research practices, using visualization software as an example. From this brief posthuman analysis of the digital in research, several posthumanist confluencies become apparent. We will expand and develop these further in Chapter 5.

The Silent Sway of Software: Coding Researchers

In this section, we interview NVivo, a popular proprietary QDA software package primarily used to assist qualitative researchers manage and analyze large datasets, such as interview transcriptions and field notes. In conducting this object interview, we offer a possible posthuman approach to Paulus et al.'s (2014) ambition for researchers to reckon reflexively with the multiple ways that "digital tools [may] challenge the ways that things have traditionally been done" (p. 3) and to consider how the digital may simultaneously be reshaping qualitative research practices and attendant discourses.

For the interview, we take up their suggestion to use Gibson's notion of affordance, but we do so in a manner more consistent with his original and radical understanding. In this way, we attempt to transgress subject/object binaries and move beyond presumptions of naked human agency or control. Uncovering the affordances and tonal atmosphere of a given technology may be fruitfully approached by attending to its invitational appeal (Heuristic 3 Listening for the Invitational Quality of Things). To explore NVivo's pathic address, we start by imagining a researcher who is thinking about using QDA software for her phenomenological inquiry project. Commencing our interview here acknowledges that a technology's "spell can occur immediately upon contact, as in the first bars of [the technology's] melody" (McLuhan 1964, p. 15).

Searching the web, the researcher locates the NVivo product page (QSR International 2016a) and discovers that it claims to be the "#1 software for qualitative data analysis." Within minutes, she has downloaded and installed the 14-day trial version. Opening NVivo for Mac (Version 11), she is prompted to either "Create a New Project" or "Open the Sample Project". She opens the sample project, and is presented with a windowed environment consisting of three main work areas: Navigation, List, and Detail View. Running along the top of the work areas is a ribbon with multiple commands on offer—Home, Create, Data, Analyze, Query, Explore, Layout, and View; and above that, the familiar application menu bar, that also includes File, Edit, and Help. Trying out the ribbon, she discovers that the "Analyze" button reveals a variety of "Coding," "Uncoding," "Annotations," and "Linking" possibilities. In the "Coding" section, for example, she can add a "New Node" or "Existing Node," "Code in Vivo" or even "Auto Code." "Query" provides commands such as "Text Search," "Word Frequency," and "Coding Comparison."

From this cursory encounter with "the first bars of (NVivo's) melody" (McLuhan 1964, p. 15), we may discern some of the QDA package's overtures to a prospective user, in this case, a phenomenological researcher. The software's invitational appeal consists of multiple explicit offerings and entreaties—"Analyze," "Query," "Annotate," "AutoCode"—as well as implicit suggestions and prohibitions. You may do everything you find here, but anything else may be difficult or impossible to do. Latour (1992) calls this collection of imperative statements prescriptions. Such pre-scripts are encoded into the design of nonhumans (e.g., the NVivo software) and subsequently "utter (silently and continuously)" their implicit directives "for the benefit of those who are mechanized" (e.g., us human researchers): "do this, do that, behave this way, don't go that way" (p. 232). Following NVivo's prescription to Analyze, for example, the researcher may choose to open an imported source file, and then proceed to code the whole document or a selected portion of its text by creating a New Node or choosing one already created. She may continue in this manner, coding each of the imported sources, perhaps occasionally choosing to Code In Vivo, Uncode, or to add a Memo or Annotation. Later, she may review her work by, for example, navigating to the Nodes, and double clicking on them to reveal the entire list of similarly coded references.

Turning to Heuristic 5 (Discerning the Spectrum of Human-Technology-World Relations), we may quickly conclude that NVivo is primarily a hermeneutic technic. Through NVivo, the researcher "reads" her source texts against a perceptual and actional background of codes, nodes, and queries: Researcher→(NVivo-Research world). In the same way that menu functions like Copy, Cut, and Paste serve to mark the wordprocessor as a unique writing milieu or *templum* (Adams 2016), Code, Query, and Memo give us clue to the particular qualitative research environment convened by NVivo. The paratextual subscripts and allowable functions of NVivo color and shape how the researcher sees and apprehends her research world.

After viewing the first tutorial video, the researcher decides to check out NVivo's Help Menu. Under the section called "Concepts, strategies and techniques" (QSR International 2016b), she is told that

> [h]andling qualitative data is not usually a step-by-step process (*first* import, *then* code, *then* query, *then* interpret and *then* write-up). Instead, it tends to be an iterative process where you explore, code, reflect, memo, code some more, query and so on. (para. 4, italics in original)

On the surface, some of the "iterative" activities described fit with her experiences of doing phenomenology. Terms such as "explore" and "reflect" are familiar to her research practice, whereas others terms like "code," "memo," and "query" are foreign. She looks up the section, "Understanding the key concepts" (QSR International 2016c). Here she happily discovers that NVivo allows her to import and work with multiple kinds of data sources. In her research, she often draws on multiple sources such as interview transcripts, written lived experience descriptions, blog entries, and even excerpts from novels or poems. But in the next subsection, she is told that

> [y]ou *code* your sources to gather material about a topic and store it in a container called a *node*. . . . When you open the node, you can see all the references in one place—allowing you to reflect on the topic, develop your ideas, compare attitudes and discover patterns. . . . Organizing your nodes is also an important part of the analytical process." (para. 3, 5, 6, italics in original)

She scratches her head, wondering how proceeding in this coding-node-creation fashion might assist in her writerly anecdote-reflection approach to inquiry. Clearly, NVivo would afford her a searchable database to store raw interview texts and other digital sources, but it is also suggesting that she adopt the discourse and iterative practice of coding, a research activity more generally associated with the inductive process of qualitative methodologies like Grounded Theory. Here, the researcher is confronted with a question: is the provision of a handy database designed to house qualitative texts sufficient reason to submit an aspect of her research practice to revision via the vocabulary, structure, and functions given by NVivo?

Of course, our researcher need not use any of the multiple coding and query functions NVivo affords, or she may decide not to adopt the QDA software at all. It is also important to admit that, while giving us a first glimpse at its invitations, the imaginary anecdote above suffers from its novice, present-at-hand encounter with the software.

> No matter how sharply we just *look* [Nur-noch-*hinsehen*] at the "outward appearance" ["Aussehen"] of Things in whatever form this takes, we cannot discover anything ready-to-hand. If we look at things just 'theoretically', we can get along without understanding readiness-to-hand. But when we deal with them by using them and manipulating them, this activity is not a blind one; it has its own kind of sight, by which our manipulation is guided and from which our manipulation is guided and from which it acquires its specific Thingly character. (Heidegger 1962, p. 98, italics in original)

It is nigh impossible to estimate the full and future value of a technology merely by looking at it. Rather, we need access to the immersive rapport that sets in between NVivo and a researcher when she is "skillfully coping" (Dreyfus 2014) with it in practice. Such skillful, prehensive knowing only unfolds as one weathers an induction to NVivo's routines, familiarizes oneself with its vocabularies, and plays with its possibilities. But, as one habituates to its range of affordances and becomes accustomed to the vagaries of its architecture, the software necessarily withdraws from view, its database structure is silently absorbed, its coding practices are incorporated and its command vocabulary taken for granted. At this juncture, one's practice has already changed. The particular "ground-configurations of effects" (McLuhan & McLuhan 1988, p. 98) that NVivo supports and mobilizes are now integrated into practice, and lost to critical circumspection.

We now turn to a team of experienced phenomenologists who decided to try NVivo for a large project investigating compassion fatigue among health professionals. Over the course of the project, Goble et al. (2012) were struck by the difference using NVivo seemed to be making to their research practices. In retrospect they realized that, on the one hand, the data analysis software served their team well in "effectively remov[ing] irrelevant sections of transcripts while bringing forth the relevant sections . . . so none would be overlooked" (p. 12). On the other hand, the more experienced researchers became simultaneously distanced from the original texts, no longer working with it by hand. Data entry, a new but relatively unskilled task demanded by all QDA software, was easily "outsourced" to research assistants. Here we begin to catch a glimpse of the amplification/reduction structure (see Heuristic 6 Applying the Laws of Media) at work when NVivo is adopted in this particular research environment. The research team also found themselves struggling with the activity of coding central to NVivo:

> [W]hen coding becomes the means by which analysis takes place and supersedes ones methodology, only generalized thematic description becomes possible. For compassion fatigue researchers, the appeal of coding risked their never exploring the phenomenon's essence. (Goble et al. 2012, p. 13)

Having bound their study to NVivo, Goble et al. (2012) unexpectedly found their methodological commitments to phenomenology compromised in favor of the software's primary and "appealing" analytic: coding.

In an effort to understand some of these unexpected effects, they employed another of our object interview techniques: Heuristic 6 (Applying the Laws of Media). Goble et al. (2012) composed the following tetrad to help make sense of their experiences. They proposed that NVivo:

- Enhances "the equality of data in data sifting";
- Obsolesces "the tactility of research" including the disappearance of handwritten notes and playing with cut-up transcripts;
- Retrieves "the punch-card expert"; and when over-used it
- Reverses into "data shuffling." (p. 12)

While QDA software like NVivo may allow a researcher to extend her project research in multiple ways (e.g., increasing the volume of data collected and analyzed, as well as opportunities for teamwork), this agential extension is enacted via the researcher's conscription to the methodological assumptions and design decisions made by the software designers. In using QDA software, the researcher must, to some extent, adjust their practices to accommodate those already adumbrated by the software algorithms and architecture. In response, the researcher's habits of mind shift and reconfigure, gestural regimes topple and reconstitute, familiar vocabularies take on new significances, and everyday modes of knowing, thinking, and doing undergo subtle and occasionally dramatic changes.

Yet, despite Goble et al.'s (2012) conclusion that NVivo "was not appropriate for phenomenological work, because . . . coding was the primary analytic feature that the software offered," Paulus et al. (2014) counter that "numerous phenomenological studies have been published in which data analysis software was used" (p. 116). They provide a vignette by Monique B. Mitchell, the coauthor of both phenomenological studies cited, who offers a glowing account of MAXQDA (another proprietary QDA software package):

> In addition to its highly intuitive colour-coded categorical system, MAXQDA provides opportunity for users to view the document system, the code system, the document browser and retrieved segments windows simultaneously. This is particularly helpful when identifying, establishing and positioning parent and child codes within and between documents.
>
> The "edit" function is another useful feature of MAXQDA. While activated, this feature allows the user to edit the original document as a means to ensure the accuracy of all the data in the system. Users are not able to

> code while the "editing" function is active to prevent accidental modifications or deletion of the original document during the coding process. Fortunately, the editing function is deactivated in the default mode, prioritizing the coding and categorizing process in data analysis. (Mitchell in Paulus et al. 2014, p. 116)

By Mitchell's description, phenomenological research consists of coding and categorizing, editing for accuracy, viewing windows in a color-coded system, documenting an audit trail, etc. Yet, these are the very research activities that Goble et al. (2012) point out do *not* belong to phenomenological inquiry. Where, for example, are the epoché and the reduction performed? Where is the site of sustained writerly reflection on prereflective experience? Where is the return to the things themselves? Mitchell's methods, under the sway MAXQDA, bear little resemblance to the methodological activities that uniquely define phenomenological research as phenomenology. Instead, the phenomenological researcher appears to be reconfigured quietly as a "MAXQDA user."

So, while Paulus et al. confidently suggest that "far from *imposing* a particular analytic structure or approach to the data, [QDA] tools *afford* a variety of functions and features which can be intentionally used (or ignored) by the researcher based on their analytic needs" (2014, p. 116, italics in original), this statement masks how software does the work it does. QDA software indeed affords a wide range of possible functions and features. But in order to bestow these possibilities, QDA software must *impose* a particular infrastructure and knowledge framework on its user, the researcher. Indeed, all software is "opinionated" (Adams & Pente 2011, p. 8). A software program's design and architecture must make certain assumptions about its users, about workflow, about vocabulary, and about the purpose and meaning of their activities. It predetermines what its users may and may not do and have access to in its environment; its lexicon and functional affordances expand but also constrain the possible conversations and activities that may unfold in its context. In this respect, QSR International's (2016a) claim that "NVivo doesn't favor a particular methodology—it's designed to facilitate common qualitative techniques no matter what method you use" (para. 2) is simply false. Clearly, "the use of QDA software sometimes offers methodological insights or creative new ways of understanding and approaching the data" (Gilbert et al. 2014, p. 231). But in providing these

amplified potentials, its users are shepherded along the limited trajectories of knowing and doing on offer by the software.

Without careful interview of the digital things enrolled in one's research, it is difficult to determine how they may not only be supporting but also potentially undermining key methodological understandings and practices. In interviewing NVivo, Heuristic 3 (Listening for the Invitational Quality of Things) was mobilized, which served in constructing several anecdotes (Heuristic 1) for further analysis. Heuristic 5 (Discerning the Spectrum of Human-Technology-World Relations) provided an understanding of NVivo as a hermeneutic technology, and as such, it makes a significant contribution to the shape of knowledge production and how research unfolds. Heuristic 6 (Applying the Laws of Media) revealed multiple tensions at stake when employing this software as a "co-researcher."

Digital Devices: Who-What's Research?

As digital recording devices become more sophisticated, portable and user friendly, they are increasingly enrolled as skilled observers, listeners and archivists; not only of human research participants but also of other digital tracings. Gourlay and Oliver (2017) describe a research project in which iPod Touch devices were distributed to postgraduate students to document their day-to-day study practices and interactions with texts and technologies across a range of settings. Here, the iPod Touch takes on the role of field researcher standing in a close, 24x7 proximity to and juxtaposition with human participants. The artifacts generated by the digital device in concert with the research participants—photos, videos, sound files, and notes—are later called upon to act as data, as well as stimulus for further in-depth exploration in the face-to-face interviews.

To glimpse how this device may be participating actively in the work of research, we turn to Heuristic 2 (Following the Actors) and ask: (1) what is the sociality around the object (using the iPod as an entry point)? what is its materiality?; (2) what kinds of work is this assemblage doing? what practices (and micro-practices) are being enacted? In this study, the iPod Touch became entangled with an array of other digital and non-digital things when it was enlisted to help the human research participants (postgraduate students) generate journals of their everyday study practices. For example, Gourlay and Oliver (2017) describe how

> Yuki shared an image captured by with her iPod Touch that she titled, "The Bathroom is a Good Place to Read." In her account of this image, Yuki described how digitized books, recorded lectures, personal notes, web links, and so on were curated using her iPad, which she placed into a clear zip-lock plastic bag so that she could study whilst bathing, an environment that provided her with the peace and space to focus on the work. (pp.80–81)

In addition to dutifully recording, storing and ultimately sharing this image, the iPod Touch also worked to help assemble, stage and make other actors visible: in this example, an iPad, bathtub, and Ziploc bag. In the midst of all this work, it seems that the iPod Touch itself did not just record everyday literacy practices. It also became part of these practices. The work of the iPod Touch did not stop there. Participants in this study were asked to organize the data they had created, bring it to the interview and then present and discuss this data with the researcher. The materiality of the iPod Touch grew to include PowerPoint or Prezi presentations made by some of the students. The iPod did not do all this work itself. Gourlay and Oliver (2017) report that the device was brought to the interview along with books, folders, notebooks, post-it notes, and pens. At this point, the iPod Touch was now working to help manage and circulate as well as authenticate through date and time stamps, assisting the human participants remember when particular images or notes had been captured. The range of micro-practices in which this device was implicated is notable.

In this array practices, the iPod Touch is clearly a social thing. Ruppert et al. (2015) write that the "as yet still undefined potential" of social things (especially data) to socialize "is tied to its capacity to establish relations within and outside itself" (p. 31). Such relations are not merely social but also material. For example, Matthew Sowerby (2016) gave iPads to youth as he conducted walk-about interviews, encouraging them to take photos of significant spaces in their school. The materiality of the iPad was deliberately considered. Compared to a digital camera its interface was more familiar to the youth and had an air of informality that invited a "snapshot" aesthetic rather than a composed neatly framed photograph. The iPad was accessorized with a rubber cover that had bumpers down each side to make it softer, easier to hold and better able to withstand the occasional bump and bruise. This assemblage made "friendly," invited students to pick it up

and use it and not worry about damaging it or needing to be overly protective.

We may now start to see the iPod Touch (or iPad) and its collection of digital artifacts as participants in this research study, generating data through their presence and activity. But the iPod Touch and its assemblage (which includes a digital camera, photo-related apps and memory) are also serving as co-researchers: generating, storing, sharing, and extending data. This dual role suggests a blurring of digital devices and the data they generate. Used in this way, the iPod Touch becomes both the *stuff* of social lives and the apparatus for *knowing* those lives (Ruppert et al. 2013). Digital things do not merely generate data but act in a far more generative fashion; such digital practices are not neutral but consequential to what is known (Ruppert et al. 2015). In this example, the iPod Touch *does.* It is an actor worth following.

Turning to Heuristic 7 (Unraveling Translations), we may inquire what sociomaterial worlds may be in play. The shape-shifting nature of a digital device as field researcher is visible in this anecdote from a study that explored how children negotiate their mobility in relation to urban spaces. Kim Kullman (2012) equipped children, aged 7–12 years old, with a digital camera and camcorder to take images on their way to and from school. The researcher shared these school journeys with the participants. Sometimes the journey involved only one child; other times they were with friends, siblings or parents. Kullman (2012) writes of one school journey walk with four girls:

> [When we] enter a nearby park, events take a new turn: Niia announces that she wants to photograph and grabs the camera from my hand. Suddenly, the girls start making pictures of each other at an intensive pace, circulating the camera from hand to hand as if keeping it in constant motion is of utmost importance. Whereas we were walking as one group before, I am excluded from this entanglement of smiling faces and limbs twisting into funny postures, which springs back and forth, at times slowing, then stopping and continuing again without forewarning. Every now and then, the girls gather around the display screen to look at their images that only appear for some 2–3 seconds due to the automatic view mode. Far from bothering them, the rapidly flickering images work like a metronome, keeping their movements in rhythm. (p. 9)

Kullman (2012) observes that in this moment, the camera shifted from being a purely representational tool into an artifact circulated as part of

playing. She explains that "although the girls occasionally viewed their images on the display screen, the activity was meaningful only to the extent that it maintained a sense of movement and togetherness" (p. 9). The screen and the capability of the camera to store and display pictures just taken enables it to toggle back and forth in these different roles.

The possibility of multiple assemblages is suggested here. Mol (2002) writes that "to be is to be related" to remind us that "nothing ever 'is' alone" (p. 54). In other words, an object becomes and does in relation to other things. When those things and relations change so too does the object. This relational and multiple ontology helps to explain how the iPod Touch and digital camera in these examples can *be* and *do* more than one thing. In Kullman's (2012) anecdote, the screen becomes part of the activity of interest while also retaining its stance as field researcher. Gourlay and Oliver (2016) question whether the visual images generated by the iPod Touch are just *aide memoires* for the interviews, illustrations, or objects of analysis in their own right. The fact that these images seem to serve and do something in all these different practices suggests the possibility of more than one assemblage. The images are mobile, able to move back and forth between assemblages and enact these digital things as both research participants and co-researchers.

Heuristic 7 (Unraveling Translations) encourages the critical inquirer to ask what sort of orderings and reorderings are being enacted. Heuristic 6 (Applying the Laws of Media) may assist in alerting the researcher to the multiple tensions at play. Considering the iPod Touch in this example as a possible 24x7 field researcher, may also point to what Evelyn Ruppert et al. (2013) describe as a decentering of the human expert in order to elicit and generate data. Several tensions arise from this kind of decentering and the pervasive, unblinking eye of the digital devices in the field. More may be revealed than intended as these devices infiltrate private spaces and private moments. The digital complicates the patrol of ethical borders, multiplying the opportunities for digital images, videos and texts to show up on unexpected screens. Yet, the very capacity of the image to expose is also a primary reason for enlisting a digital camera in research practices. The human research participant with iPod Touch is able to generate a digitized, pictorial show whose framings—and sometimes croppings or magnifications—may reveal previously unnoticed aspects of a world. Simultaneously, the subject of this digital

gaze is immobilized as a visual data point, a file that is now available for immediate circulation, translation, and transformation.

Digital data has lightning speed portability and the ability to take on social lives far beyond that of handwritten field notes. Such mobilities create possibilities for further slippages and movements outside the traditional researcher-participant-data relationship. With an array of accomplices, these images now circulate with newfound ease: at a press of a button or a swipe and click of a mouse, they are viewable, transferable, copyable, shareable, cropable, modifiable and deletable. Through such reordering of relations, there is evidence of both a deskilling and upskilling of the researcher's work. Staying with the Heuristic 7 (Unraveling Translations), interview questions could focus on the collateral realities being enacted in the practices described in this section. Deskilling is possible as some research practices are outsourced to digital co-researchers, especially fieldwork. But there is also a potential upskilling in play here. Interfacing with digital co-researchers and working with the encoded data generated now demands sophisticated digital curation skills: selecting, arranging, describing, annotating, aggregating (re)using, organizing, interpreting, storing, jettisoning, as well as the care for digital objects (i.e., Barrett 2012; Flanders & Munoz 2012). We will elaborate further on the tension between deskilling and upskilling in Chapter 5.

By employing several object interview heuristics to interrogate the iPod Touch *in situ*—following the actors, unraveling translations—we have begun to discern how a technology may unexpectedly introduce new ethical tensions and responsibilities into research practice. Attributing co-researcher status to the devices such an iPod helpfully brackets the humanist assumption of sole agency and reveals a more distributed, complex fold of enactments.

The Sociomateriality of Data

The digital evokes new and often more complex ways to engage with data. We have examined how research practices are increasingly entangled with software and digital devices. We now turn more explicitly to the production, manipulation, analysis and representation of data, an often taken-for-granted actor in research. Of particular interest is digital data. The digitalization of data has amplified its mobility and performativity. Bits and pieces of texts, images, and numbers are distributed, often public,

fragmented, and entangled in multiple circulations. Consider Twitter streams and hashtags, online photo sites, Facebook updates, online ratings and reviews, wiki entries, blog postings, text messages and real-time aggregation or visualizations of archived data. Such data fits Kallinikos et al.'s (2010) description of unbounded, evasive, distributed and constantly mutating digital objects.

A posthuman reading suggests that data is not a thing *per se* but rather a relational effect. As Stiegler (2016) notes:

> The digital object is utterly relational. As such, it constitutes, together with the sociotechnical artifacts that are its conditions of possibility (such as the norms and standards of markup languages such as GML, SGML, HTML, or XML), a digital milieu. (p. ix)

Data is not something to be pointed to as a concrete bounded object shuttling from one point in the research process to the next, but rather a continual re-enactment of relations. It *becomes* what it is in a particular moment through these relations. Data could be considered an actor-network: a labyrinth of multiple relations that includes actors from other places and times (in the spirit of Latour 2005). Or, perhaps it is a meshwork (in the spirit of Ingold 2012a) with data conceptualized as lines of movement and the data assemblage as improvising passages as it moves.

By "digital data" we mean research materials that have been digitized, that is, converted to binary numbers, or produced via digital means, from interview transcripts rendered in Word documents to trace, archival, or data logging generated through online activities or device sensors. Such data *becomes* as it is lashed together with other actors. For example, wiki or blog postings may be rematerialized as screen captures, a quote in a Word document, or a URL stored in Evernote. Each of these acts entails a further encoding of already encoded data. Data becomes *differently* as it travels with and through NVivo software, is subjected to visualization software, shared through files uploaded on Dropbox, or massaged into a direct quote in a PowerPoint presentation. Data is *lively* (Savage 2013) and takes on different social lives. Orlikowski and Iacono's (2001) description of an IT artifact could aptly be applied to digital data: "a multiplicity of often fragile and fragmentary components, whose interconnections are often partial and provisional and which require bridging, integration, and articulation in order for them to work together" (p. 131).

Digital data is generative and energetic. Today it is ubiquitous and often "big," yet it is almost always black boxed. Data-related debates extend beyond academic researchers. The growing datafication of everyday life can be observed in decision-making based on crowdsourced data and predictive analytics, the traces of online activities populating global databases, pervasive mechanisms of the quantified self, and how the openness and ethics of data ownership are increasingly subject to public deliberation. Everyday work, learning, and living activities generate a significant amount of digital data: some of which is knowable and accessible by us, and much of which is not. Beer and Burrows (2013) draw attention to *by-product data* or "data generated as a by-product of new forms of popular cultural engagement" (p. 49). Hayles (2006) acknowledges the "huge pyramid of data flows, most of which occur between machines" and in which humans are embedded as one of many actors (p. 161).

We may well be living in a data paradox. More present, pervasive and lively, digital data is also more captured and blackboxed by powerful actors, including public and private sector keepers of global databases and large-scale data aggregating entities. As new assemblages of digital data take center stage, the scale, mobility and spaces of research are also being radically reconfigured. To examine some of these changes, we turn to an example of visualization software used for a small learning analytics research project.

The Many Social Lives of Data Visualized

The growing swaths of trace and archival data made possible through prolific professional and personal interactions online has opened up new ways to scrape, analyze and visualize data. Take, for example, interactions between people and digital things that unfold in virtual learning environments such as Moodle and Blackboard. Such digital traces are easily recorded and stored. Small-scale and relatively unsophisticated analytics, such as counts of the number of postings students have made in a discussion forum, have long been a feature of online learning management systems (LMS). However, burgeoning interest in big data is prompting efforts to generate more in-depth and sophisticated analytics, even in an ordinary LMS.

Thompson was one of the researchers in the oPEN project, a collaborative development of an online networked space through a University-Local Authority partnership to foster masters-level learning and bring together practicing professionals, university tutors and critical colleagues

(senior teachers recruited from the partner local authorities). This example builds on research reported in Anna Wilson et al. (forthcoming). The research team created a series of analytics using data easily obtainable by instructors from the Blackboard LMS used in the project. Here, we focus on the work that went into analyzing postings in a discussion forum and clicks on online resources. The limited analytics technologies in the LMS necessitated a foray into external software to visualize and analyze the digital traces generated in Blackboard. The team turned to NodeXL, an open-source network analysis and visualization software package designed to work with Microsoft Excel.

Because the data did not merely travel from Blackboard to NodeXL, right at the outset it is possible to catch glimpses the way data detours through Excel. Spreadsheets created in Excel included exported data from Blackboard as well as other data input manually. Excel served as staging space where data was cleaned and prepared for its work in NodeXL: sorting, filtering out extraneous bits, compressing, and rewriting. Entries in NodeXL need to be in a particular form: nodes and lines decided and clearly articulated. Data was then "analyzed" and visually represented as it was plugged into drop-down menus, reports, filters, and algorithms that dictated different layout possibilities (such as the size of a symbol in the image based on the number of hits). In NodeXL, data worked and was worked on in ways distinctively different from Blackboard and Excel.

Although Excel was the holder of all the data, the data continuously overflowed this software space. Only bits and pieces of the data could be introduced into NodeXL at a time. The analyst constantly clicked back and forth between a particular visualization image (i.e., network graph), the spreadsheets in Excel from which the trace data was drawn, and the actual discussion forums in the original online course. There is a sense of continually visiting, *with* the data, its various iterations: its *becomings* and *doings*. At one point, all the postings in each discussion forum were printed out, using scissors and a glue stick, and reassembled on an office wall to provide another form of visualization. Discussion forum texts were also turned into Wordles, another software space that demanded decisions about what text to include (or exclude) as well as graphical elements such as shape, size and color.

What work is going on? The overarching analytic work set for visualization software is to search for patterns and anomalies. Mike Savage (2015) suggests that the desire to discern aggregate patterning has led to a new

interest in visualizations such as word clouds and sociograms. He announces the re-emergence of the "glance" and new possibilities for ordering of the social through "visual aesthetics" rather than "causal statistics of textual hermeneutics" (Savage 2015, p. 308). Although the data in the oPEN example is "small" in comparison to today's "big" data, it nevertheless provides a glimpse of the many translations such data undergoes.

The digital data in this example is far from a coherent and unified thing. Rather, it is a constantly changing assemblage with some actors falling off and others bolting on. The original digital traces generated in the Blackboard space are already a complex assemblage including student-instructor-device-network-LMS server-digital resource (Wilson et al., forthcoming). By following the actors as the data moves from Blackboard to Excel to NodeXL (and other assemblages including paper-glue-stick-wall), the translations and connections that are transporting transformations may be glimpsed (Latour 2005). As David Ribes and Steven Jackson (2015) observe in their own research, at any of these "tiny transitions data again threaten to become unruly masses" (p. 163).

These translations are not merely a few small adjustments as the data moves into different software spaces and encounters different algorithms. Each software space seemed to mark a shift to the amenability of data to talk with, and through, other actors. The data does not stay intact as some bounded entity that moves from one analytic network to the next. In each software space different bits and pieces of the assemblage become more prominent and others fade away. We suggest that the trace data becomes differently in each assemblage. If we consider data as a line of movement (Heuristic 8 Tracing Responses and Passages), we may observe the data assemblage casting about for new actors to plug into as others fall by the wayside. Freezing some of the data into a visualization graphic does not arrest the movement. Rather, it becomes something else and begins yet another line of movement.

Visualization images generated in this fashion cannot be treated as a closed system. Batty et al. (2015) describe the visualization of nonspatial data as "methods for displaying networks and various statistical graphs", a process urged along by intersecting advances and trends in hardware, software and the real-time nature of data streaming (p. 247). The analyst in the oPEN project found herself regularly saving visualization images (network graphs) as stand-alone files because there was no guarantee that she could replicate a particular network graph at another point in time even if using the same data and algorithm to run an analysis.

The digital data here is subjected to dramatic translations as it is roped into different assemblages so that it can move and work. So that a student click on an online resource can somehow become a visual network graph depicting patterns of online activity. Patterns that can then be compared with other patterns of activity. The data assemblage is energetic. It is and does lots of things. It seems to enact multiple realities (i.e., Mol 2002). But not all the actors in the data assemblage are mobile. Wiki contributions are not recorded and do not generate a digital trace that can be harvested by the limited analytic technologies in Blackboard: data made invisible.

It becomes difficult to pinpoint what the original data is or where the raw data resides. Exactly where is data generated? Is the data the record of student clicks and posts in the online course? Rows in an Excel spreadsheet? Nodes and edges in NodeXL? Perhaps it is more helpful to think of *data multiple*. In this sense, there are different lines of movement, some stronger or more persuasive than others. The digital data here works hard to continually perform as digital data: indeed, it performs itself. As it plugs into other actors or moves on to other configurations, it does different work. Ribes and Jackson (2015) stress the danger of assuming data transitions as linear—as somehow implying a beginning and end for data:

> We tell ourselves that we live in an era of aggregation and automation. From this perspective, raw data patiently await assembly. . . . Click. Shuttled from data storage to a computing center, the analytical engines of the twenty-first century assemble statistics, graphs, and ever more clever visualizations in response to these and many other questions we have not yet thought to ask. (p. 164)

Instead, they argue that there is another narrative for data: "one of temperamental and delicate creatures, whose existence and fraternity with one another depend on a complex assemblage of people, instruments, and practices dedicated to their production, management, and care" (Ribes & Jackson 2015, p. 164).

Speaking with the Things of Research

In this chapter, we showed how our heuristics may be reflexively applied to the digital tools of today's research work. We interviewed two such technologies and explored critically how the digital may be remediating and

co-shaping research practices. We also took a brief look at what digital data is and how it "becomes" in the activities of research. Ingold (2012b) writes that "to understand materials is to be able to tell their histories—of what they do and what happens to them when treated in particular ways—in the very practice of working with them" (p. 434). This is a way of speaking with things.

The expertise of every professional is indebted and intimately tied to the ready availability of contemporary, specialized equipment in the performance of specialized work. Introna (2007) points out that decisions and actions are often delegated to technology because it is convenient or necessary. However, he adds that we always delegate more than we realize. While we may appreciate the gains in usefulness, efficiency or convenience a new technology affords us, awareness of the subtle changes in our ongoing way of being may only emerge upon later reflection. Delegation to the digital is increasingly evident in research practices.

As researchers' ways of thinking, being and doing are increasing shared, distributed and supported by digital materialities, new epistemological, ethical, ontological and political considerations come into play. Enrolling the latest technologies into one's research projects may seem a sound practice, but closer examination suggests a more complex picture. Today, there is a growing chorus of researchers (Burrow & Beer 2013; Lupton 2015; Prinsloo et al. 2015) agitating for sociological research practice to become more digitally sophisticated. Object interviews encourage a more critical reckoning with the digital things implicated in research practices and the co-evolving work of research.

CHAPTER 5

Posthuman Confluencies

Abstract In our final chapter, we consider five posthuman or digital confluencies that have come to matter in today's professional work and learning practices, paying particular attention to the work of researchers: developing a posthumanist ethic; anticipating changes to our thinking, being, and doing; reckoning with the deskilling and upskilling of work practices; dealing with digital data; and questioning digital politics. We suggest that our heuristics can play a key role in addressing some of these new professional responsibilities, some of which may have far-reaching ethical, political, social, and policy implications.

Keywords Digital confluencies · digital data · posthumanist ethics

Digital technologies have been catalyzing a seemingly endless series of shifts and adjustments to our professional and personal worlds. Few are immune. Educators grapple with one-to-one laptop classrooms, mobile learning, and learning analytics. Healthcare professionals depend on an increasingly vast complex of diagnostic tools, monitoring devices, and health informatics. Human and social science researchers engage a growing host of computational and communication technologies to conduct their inquiries—from Google Scholar to qualitative data analysis (QDA) software. The digital is changing not only the shape of information, the

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speed of data generation, and access to knowledge, but also more fundamentally, how we think, work, learn, socialize and live today.

Researchers and practitioners alike may no longer assert confidently that "technology is just a tool." Drawing such unambiguous lines in the sand only serves to elide an unexamined belief in humanity's dominion over technology, and positions material objects as benign, neutral, and subject to our moral whim and disposal. In the process, crucial questions concerning technology and its complex interactions with and impacts on our personal, professional, social, cultural, political, spiritual, and ethical selves and practices are silenced. Life today is characterized by an intensifying proliferation of digital devices supporting, informing, and in some cases, radically transforming human activities. Increasingly, humans are outsourcing their daily routines, knowledge practices and decision-making to software programs, big databases, algorithms, and global circuitry to perform this work on their behalf. New demands, responsibilities, and ethical tensions are emerging. Situated at the center of much that transpires today, the digital is indeed more than "just a tool."

This book has been about things—digital things. We opened with a call to return to the things themselves, to "the rich world of things discarded [through the sieve of humanity] like chaff so thoroughly, so immediately, so efficiently that we don't even notice" (Bogost 2012, p. 3). In the process, we hoped you would come to embrace your inner—and outer—cyborg, as we traced how our everyday lives and professional practices are always already intertwined with things. Indeed, we humans have always been both a who and a what:

> If the individual is organic organized matter, then its relation to the environment (to matter in general, organic or inorganic), when it is a question of a *who*, is mediated by the organized but inorganic matter of the *organon*, the tool with its instructive role (its role *qua* instrument), the *what*. It is in this sense that the *what* invents the *who* just as much as it is invented by it. (Stiegler 1998, p. 177)

Adopting this posthumanist understanding helped relax some of the stark lines that have separated humans (the who) and nonhumans (the what), and allowed us to relinquish for a moment our "Cartesian habit of mind" (Barad 2003, p. 806). Along the way, we discovered that our ongoing (post)human becomings—our ways of thinking, being, and doing—are intimately involved with, supported by, and vitally co-constituted through our technologies.

Our eight object interview heuristics—drawn from ANT, phenomenology, and related approaches—provided purchase in today's posthuman world, entry points for pursuing further inquiries. Throughout this book, we explored and showed how it is possible to speak with things, to query them, and to inquire critically about the contributions each may be making in our personal and professional lives. The first four heuristics—gathering anecdotes; following the actors; listening for the invitational quality of things; and studying breakdowns, accidents, and anomalies—asked the researcher and practitioner to attend to their immediate surround, and to attune to what things may be saying and doing. The second four heuristics—discerning the spectrum of human-technology-world relations, applying the McLuhans' (1988) "laws of media," unraveling translations, and tracing responses and passages—focused on different ways to analyze the medialities and materialities of practice we had uncovered. Once more, we remind the reader that the object interview heuristics presented here are by no means intended as a cookbook of step-by-step recipes. Rather, we hope the book may be employed as a possible compass, not a complete roadmap, to explore critically today's posthuman terrain.

We then turned to interrogate the digital landscape of qualitative research practice itself by unraveling examples taken from recent empirical studies in educational and social science. Savage (2015) writes that "sociologists find it easier to treat the digital as an object of study, rather than construing the digital as itself central to their research" (p. 308). We tackled this dilemma in Chapter 4 through our object interviews with NVivo and an iPod, and saw how digital technologies and the data they generate perform as *co-researchers* in research practice and knowledge construction. Such involvements inevitably introduce new tensions and contradictions.

New Confluencies

Our ongoing immersive entanglement with things ultimately raises questions about the increasingly sophisticated digital fluencies that have come to matter in contemporary professional practices. In previous writings (Thompson 2015b; Thompson and Adams 2014), we opted for the term "fluencies" over "literacies," as a way to think beyond narrow conceptions of skill and instead point to the expertise, criticality, responsivity, creativity, epistemological, and ethical concerns bound up and demanded

in many of today's human-technology-world interactions and correspondences. Within the context of the posthuman, we now feel compelled to use another term: *con*fluency. Digital confluency emphasizes the co-constitutional arrangements that are enacted via new mergings and flows with the digital. These confluencies are not merely about knowing how to use new technologies. Rather, they acknowledge the many humans and nonhumans caught up in complex choreographies of knowledge practices. In a similar move, Knox and Bayne (2013) take issue with traditional, human mastery or "skills"-based understandings of digital literacy, and suggest instead that professional practices should be conceptualized as "always and already enmeshed in composite socio-material assemblages, in which human involvement needs to recognized as partial, irreducible, and sometimes modest" (p. 13). Below we suggest five confluencies implicated in professional practices, with a special focus on human and social science research. Each posthuman confluency opens new questions for critical consideration and discussion.

Developing a Posthumanist Ethic

At the heart of our inquiries beats the question of ethics. The first confluency involves reckoning with how our concerns and responsibilities as researchers and practitioners are increasing distributed across networks of coded materialities. Posthumanism tells us that the borders between the who and the what are contingent, fluid, and leaky. Where, for example, does one's responsibility begin and end if professional practices are increasing shared or outsourced to software programs? What are the implications for family life and personal wellbeing as the separation between work and home is eroded by networked mobilities operating around the clock? While some of our technology-human entanglements may be deliberate (e.g., a teacher may choose to use Facebook to engage their students), practices may also change in far more subtle and unseen ways as the tentacles of other "distant" actors (e.g., big data collected by Facebook may be used by unknown others) and practices (e.g., Facebook may connect students' and teachers' lives in unexpected ways) are manifest closer to home.

Near as well as far-reaching involvements—extending across both time and space—introduce new ethical tensions and responsibilities. What are our moral obligations when the pulse of the globe is at our fingertips? Issues of agency and its distribution across actor-networks are complicated

and condensed by powerful digital actors such as Google, learning analytics, and big databases. How may citizens begin to uncover, explore, and comment critically on what is happening when they cannot see inside the black boxes of proprietary algorithms, let alone understand them if they were granted such access? Such questions point to a need for a more informed and educated global citizenry able to engage in debates about digital issues.

If we acknowledge that our practices—including our research methods—are necessarily performative and world making, and that our thinking, being, and doing are always already infected today with the digital and its programs, how may we hope to act responsibly? If ontology and epistemology are intimately intertwined, and if knowledge is simultaneously enacted and discovered, what might ethics look like in such a situation? Early on, Haraway (1991) framed the problem of our hybrid, cyborg selves like this:

> The "eyes" made available in modern technological sciences shatter any idea of passive vision; these prosthetic devices show us that all eyes, including our own organic ones, are active perceptual systems, building in translations and specific *ways* of seeing, that is, ways of life. There is no unmediated photograph or passive camera obscura in scientific accounts of bodies and machines; there are only highly specific visual possibilities, each with a wonderfully detailed, active, partial way of organizing worlds. All these pictures of the world should not be allegories of infinite mobility and interchangeability, but of elaborate specificity and difference and the loving care people might take to learn how to see faithfully from another's point of view, even when the other is our own machine. (p. 190)

We are mediated, distributed beings. Our vision is necessary partial, and too, inclined by our devices. Developing a posthumanist ethic involves grappling with the multiple implications of our hybrid, networked selves. The posthuman knows that adopting a digital technology means subscribing to its enhanced "eyes" but too, to its opinionated algorithms and complex decision-making structures. Like our digital technologies, we too are dark chambers, impenetrable black boxes that reach deep into the local and extend broadly into the global.

Our intimate relations with digital technologies, as well as the mangled and entangled status of our practices, mean that we must rethink our taken-for-granted bifurcations anew. The National Rifle Association's slogan, "guns don't kill people, people kill people," provides a simple example. A posthumanist formulation corrects this incorrect dissociation

of the object (gun) from the subject (person). Reformulating the slogan with the appropriate border-dissolving hybrid—"guns don't people, gun-people kill people"—highlights our co-conditioned and hybrid status. Yet, it would also be a mistake to imagine that this new equation relieves the gun people of some moral responsibility. As Kathrin Thiele (2014) has pointed out, our hybridity not only distributes but also amplifies our implicatedness. Distribution of agency must not be equated with distribution of responsibility. Ethics urgently needs to press beyond narrow conceptions of the stand-alone, autonomous human being toward what David Roden (2015) calls the networked Wide Human (WH).

At the root of this confluency is the recognition that ethics always involves cuts: yes to this, no to that. Posthumanism queries and queers the many taken-for-granted cuts and cleavages that have undergirded western thought—subject/object, human/nonhuman, male/female, nature/culture, etc.—and throws us into a churning unbounded world of flowing, networked hybrids that associate and disassociate. Here humanism's binaries no longer hold, and classical ethics is set adrift. Posthumanism means that the project of ethics must find new ground and begin anew. Axiology is intimately intertwined with ontology and epistemology.

Anticipating Changes to Our Thinking, Being, and Doing

The second confluency considers the possible translations and transformations that are mobilized by the digital. Posthumanism tells us that each time we involve a new technology in our personal or professional practices, we evolve ourselves in some fashion. Or as Merleau-Ponty has observed, "our existence changes with the appropriation of a fresh instrument" (1962, p. 143). When we talk about literacy, for example, we should more rightly describe our expanded, educated selves as *co*-literate, since literacy depends on the habituated hermeneutic and embodiment relations we share with our reading and writing technologies—books, pens, paper, etc. As Walter Ong (2005) has previously shown, reading and writing technologies restructure our consciousness; "the clarity and orderliness of our thinking is dependent upon the coming into existence of a specific, material, and mechanical practice of jotting down letters and words" (Vlieghe 2014, p. 524). What does it mean to our thinking then, when pen and paper are obsolesced by keyboard and word processor? Or to data analysis, when

highlighter, pen, and transcript are replaced by the coding strategies of NVivo? When adopting a new technology, we must now ask: in what ways might our thinking, being, or doing be altered by this new technology?

In considering research practices, Deborah Lupton (2015) questions to what extent researchers—inside and outside of academia—"are simply taking up digital media analysis tools to harvest data to, and to what extent are they challenging these tools' usefulness or even focusing attention on the tools (and digital platforms and digital data) themselves as objects of research" (p. 65). In Chapter 4, our object interview with NVivo suggested that it, and other QDA software, sponsor prescribed (default) frameworks for organizing and analyzing data. This scaffolding explicitly and implicitly informs how a researcher performs her research. Along these lines, it is important to keep in mind that

> [d]ata collection, as the practices of inscribing and transcribing, is not a neutral act of moving around in the world "picking up" things that are just lying there waiting to be collected. Data collection practices are actions that cut, and in cutting, enact. Moreover, such cutting matters, not because it needs to be representative or objective, but because the "how" we cut conditions the sort of entities our cutting enact—and much more besides. Likewise for the acts of "coding" and "analysis." (Introna 2016, p. 3)

Cuts are acts of division and separation, of analysis and of valuing this and not that. Research practices are themselves never neutral, nor are the technologies that support them, whether pen and paper or QDA software. In shifting one's practice in whole or in part to a new technological environment, some translation is necessary: "To translate is to betray: ambiguity is part of translation" (Latour 1996, p. 48). But these sorts of translations are not always evident.

Paulus et al. (2014) confidently claim that any frustrations a researcher may experience with QDA software are due to a lack of knowledge of the system's affordances, not a significant methodological dissonance:

> The perceived limitation of CAQDAS [QDA] packages are based on the individual analytic approach rather than on principal methodological incompatibilities. Most users are not fully aware of the capabilities of the software and may therefore be disappointed with their experience. (p. 117)

By this human-centered view, QDA software affords its users possibilities, but is otherwise neutral (it is "just a tool") and benign (it can make no negative contribution of significance to a human practice). From a posthuman view, we suggest that no matter their methodological commitments, *all* researchers ought to be aware that when they adopt a new technology, they necessarily submit their professional practices and ways of knowing to possible and sometimes significant revision. Researcher reflexivity ought not to end by inquiring, what are the many capabilities of this software? Gilbert, Jackson, and di Gregorio (2013) concur:

> New tools do offer new affordances—new capabilities and opportunities—and often carry implications for ethics, privacy, and representation that should be addressed directly and thoughtfully . . . The reality is that *every* tool influences [research] practice—from audio and video recorders to word processors or even note-taking—and researcher reflections on methods must also include reflections on the thoughtful use of appropriate tools. (Gilbert et al. 2013, p. 230)

The question remains: how to engage in such reflection? We believe that interviewing objects, in the manner given in Chapter 4, may assist in this crucial task of researcher reflexivity. By engaging the heuristics, researchers and practitioners may fruitfully inquire: In what ways may a new technology serve to support my epistemological understandings and methodological alignments? In what ways may it alter or undermine them? Throughout this book, we have been conscious of the performativity of the posthuman research practices we have been exploring. Indeed, one reviewer of this book asked what is enacted through the use of these heuristics including the accounts that they help to constitute and generate. One consideration is the work that goes into "developing practices of assemblage" (Edwards 2012, p. 205). The heuristics may also serve to push us humans a bit offside, and thereby remind us of our more modest roles as co-practitioners in the performance and reshaping of practices.

Reckoning with the Deskilling and Upskilling of Work Practices

Here, a third and related confluency is called into play. Researching the digital, researching with and through the digital, and dealing with digitally generated and manipulated data demands new capabilities and knowledges. In the wake of a new technology adoption, the researcher's or practitioner's work is potentially both deskilled and upskilled. Deskilling may occur as

professional practices are increasingly downloaded to the digital (see also interpassive background relations in Heuristic 5 (Discerning the Spectrum of Human-Technology-World Relations)). But these new arrangements do not evoke only deskilling. Upskilling may also be necessitated, as software and hardware become increasingly sophisticated, demanding fluency with specialized languages, graphical user interfaces (GUIs), and new modalities of interaction (see hermeneutic relations in Heuristic 5 (Discerning the Spectrum of Human-Technology-World Relations)).

Introna (2007) describes the seduction of delegation: we always delegate more than we realize to devices. While we may immediately appreciate the gains in efficiency, or convenience, awareness of the subtle changes in our ongoing knowledge practices or way of life may be much more difficult to detect. This third confluency focuses on how we address these kinds of shifts in practice. Reflecting on the work of researchers, Paul Prinsloo et al. (2015) ask whether the future researcher will need to be "statistician, mathematician, computer scientist, database administrator, coder, hardware guru, systems administrator, researcher and interrogator, all in one" or move to a more team-based approach especially in the face of big data and mixed methods projects (p. 297). We hasten to add that such a digital renaissance researcher would necessarily engage a staggeringly complex team of digital things. Thus, how do we grapple with and anticipate the evolving roles of today's and tomorrow's workers and citizens and their digitally infused and infected practices?

Dealing with Digital Data

The fourth confluency considers the implications of understanding digital data as something relational and performative. What does it mean when data is not frozen, but lively, mobile, and mutable? This question is not limited to academic researchers. Increasingly, every movement and gesture we make is being grammatized, that is, converted to digital data. Every transaction is logged, every keypress tracked, every image stored. Once grammatized, data is open for programming, for calculating, and for mobilizing. In Chapter 4, we saw that data is a relational thing. It is more hybrid, fragmented, and tenuous than might be evident at first glance. What tensions become apparent as the mobility of data wrestles with practices of solidifying data in order to contain and analyze it?

The performativity of data raises further questions. Norman Denzin (2013) writes, "Data are never silent, they speak up, get rowdy, act up,

resist being turned into commodities, produced by researchers, perhaps owned by the government, or by funding agencies, or by researchers" (p. 354). Denzin's statement is a prompt to move away from humanist assumptions of our dominion over data. Indeed, a significant degree of ordering and disciplining of data is done by other digital things. The agency of data is therefore shared and distributed across networks of many human and nonhuman actors. Learning to work with these complex data circulations is one aspect of this digital confluency.

This brings us to current debates around big data and the high-profile, big-stakes challenges of mining, capturing, curating, storing, and analyzing large data sets. How are qualitative researchers positioned to take on this challenge? Rob Kitchin (2014) observes that "big data should complement small data, not replace them" (para 9), suggesting that there is an increasing need for sophisticated qualitative work in big data projects. But there is more here for qualitative researchers to do beyond just supplementing big data work. A posthumanist perspective suggests that qualitative researchers may have much to offer in terms of describing and critically questioning: (1) what digital data is and becomes in the process of research; (2) its mobilities and immobilities; and (3) how data both pushes back and facilitates research practices.

Questioning Digital Politics

The scale, mobility, and spaces of research are being radically reconfigured as they become more distributed, public, and fragmented, as digital actors become more diverse and ubiquitous. These new spatial configurations bring both challenges and opportunities that require navigation and negotiation. The scale and mobilities of professional activities are changing, evoking tensions and opportunities to be navigated. Law (2004) urges practitioners to attend to the messiness of othering. He points out that "matters are relational: what is being made and gathered is in a mediated relation with whatever is absent, manifesting a part while Othering most of it" (p. 46).

This fifth confluency addresses the politics of technologies enrolled in these more fluid research-related work and learning practices: what is excluded, marginalized, or silenced? Conceptual work is political work. How to think critically about the role of the digital in the unfolding of professional and personal ways of being and doing is timely. Reflecting on the excitement surrounding big data Savage (2015) writes that it is the way that the digital can "strip down complex phenomena into binary form

so that they can be manipulated more easily which explains the enthusiasm social scientists—as all other kinds of users—frequently exhibit when their data becomes digitized and when they use computerized modes of analyses" (p. 304). As we have illustrated throughout this book, considering a range of research practices from a posthumanist stance suggests that as digital things *do,* one must vigilant about what is also being black boxed, translated, and othered in the wake of new alliances.

We do not conclude with a definitive set of prescriptions, next steps or best practices but rather offer these digital confluencies as openings for debate, further research, changes to practice, pedagogical innovations, and policy possibilities and response across workplaces, society, and educational institutions. Addressing these confluencies is one way to begin wayfinding (Ingold 2000) through digitally saturated practices. As you engage with the heuristics presented in this book, you are already enacting the digital confluencies we are highlighting, as well as developing a more critical and thoughtful grasp of human-technology-world relations and their implications for our professional practices and everyday world.

In Closing

In closing, we remind that the object interview heuristics presented here are tentative, themselves materialities which can also translate and betray. Mol (2010), writing from an ANT perspective, explains:

> The terms and texts that circulate in ANT are co-ordination devices. They move topics and concerns from one context to another. They translate and betray what they help to analyze. They sharpen the sensitivity of their readers, attuning them/us to what is going on and to what changes, here, there, elsewhere. In one way or another they also intervene, not from a place of overview, but rather in a doctoring mode. They care, they tinker. (pp. 265–266)

We may no longer claim to be the modest witnesses of yesterday's human and social sciences; rather we are all participating in our own becoming, mobilizing, and extending ourselves through new technologies, reshaping our individual and collective practices and evolving the human meaning project. We are not doing this alone. It is time we said hello to what is most near to us: things.

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