Ready to Wear: A Rhetoric of Wearable Computers and Reality-Shifting Media

Isabel Pedersen

2013

Chapter 1
pages 1-28

Introduction: Rhetoric, Reality-Shifting Media, and Imminence

We want to read people's minds. We want to live forever. We want to be invisible.[1,2] Such comic strip scenarios and science fiction dystopias are key players in the advancement of science. Putting this fact aside for the moment, let us deal with the last item in the list of seemingly far-flung human ambitions that science seems to be addressing these days: invisibility.

Invisibility has indeed recently made its way onto the radar of the possible. Researchers in the United Kingdom, Russia, and the United States are racing toward the culmination of an invention that will render a thing or a person imperceptible to the human eye. A wearable invisibility device will clearly enable a person to shift reality for herself and for others whom are unable to see her—or who can only see her when she chooses. Conceptually, *being invisible* would certainly alter ontological and more tangible notions of human existence if scientists ever achieve such a thing. A device that would encourage people to control their visibility (and presence) would ultimately suggest a powerful, ambient, personal interface. Invisible immersion in the real world would alter the ways we move within actual physical environments as well as how we interact with other people and structure our existence in the world. It could lead to extraordinary augmented reality gaming scenarios. Or, perhaps it would be limited to amateur magicians and parlor games. Clearly, it would also summon grave political debates. Would we skirt surveillance? Become augmented *surveillers*? Or, would we succumb to state surveillance in ways never before imagined? More tangibly, however, is the fact that, just by talking and writing about this invention, we are already *altering notions of human existence*.

The emergence of inventions, rather than the culmination of them, acts rhetorically upon us just as we drive them forward. The means

through which we are convinced to embrace future reality-shifting inventions today both shapes and orients us toward them; nevertheless, these means also shape the invention itself. Invisibility serves as a great, far future exemplar for device-driven, wearable, reality-shifting media because it currently undergoes its emergence through rhetorical processes. Through their long process of invention, these new media enter the ring and (re)constitute "our ways of knowing and acting in the world" (Stillar 61), which, ultimately, (re)defines us as social agents. This book attends to this dual process.

Reality shifting is a term used to refer to several wearable technologies that exhibit rhetorics or make claims about augmenting the real world with a virtual aspect. The most basic example of reality shifting is the way a digital media player like an Apple iPod [3] enables people to augment their everyday experience with a virtual component (e.g., consume music, videos, and text files while doing other things). This sort of reality shifting has gone on since 1979, when the Sony Walkman made it quite easy to carry around a music collection using a portable device. Of course, portable transistor radios were common in the 1960s, but the Walkman let a person *wear* his own music preferences as recorded on cassettes. These days, watertight casings, waterproof headphones ("H20"), and everyday swim goggles make the iPod Shuffle available for deep-sea diving. Immersed in such an alternative environment as water, the swimmer might shift her reality further with a rousing version of "Yellow Submarine."

Reality shifting is also a term that refers to experiences generated by several types of very similar current technologies including mobile augmented reality, mixed reality, and locative media. All of these involve a technology that strives to augment the real world with a virtual aspect for mobile humans (Mann, "Mediated Reality"; Azuma, et al.).[4] Augmented reality privileges the visual, although it is not limited to it. For years, inventors have been working on eye displays and, presently, retinal displays that project virtual images right onto the eye, bringing people an augmented virtual experience. One group of inventors has created smart glasses, which translate foreign languages "on the fly" during conversations, using subtitles (NEC Corporation). In 2012, Google announced the coming of *Google Glass*, a head-mounted, augmented reality eye display deliberately made famous by a massive publicity campaign. Launched with a YouTube video called "One Day," viewed more than seventeen million times in the first three

months, Google Glass emerges with pop star bravado, representing the first introduction to reality-shifting media for many people who had never heard of this kind of technology previously (Project Glass: One Day…). Society celebrates and anticipates Google Glass long before any person will wear it in the ordinary course of life. Some reality-shifting devices are driven by pure whimsy. For example, while appearing at the 2010 Grammy Awards, British performing artist Imogen Heap wore a "Twitter dress," and she streamed fan pictures on her handbag throughout the night. By *wearing* her twitter feed, fans "accompany her on the red carpet" (Heap). Even more whimsical is "meta cookie," a computer headset worn over the nose and eyes that tricks the mind into thinking that a plain cookie is actually lemon-flavored (Narumi, et al.). Some technologies associated with reality shifting cross into the areas of transhumanism and posthumanism, which might not be whimsical at all. They often involve a steadfast devotion to overcoming the perceived limits of the categories that define the human condition using technology that promises to extend life or strives to overcome mortality in various ways.

Reality shifting is a deliberately broad term; it allows for analysis to dwell on rhetorical concept and motive, in conjunction with machinery and digital code. Kenneth Burke writes that "the basic function of rhetoric, [is] the use of words by human agents to form attitudes or to induce actions in other human agents" (*Rhetoric* 41). Rhetorical motive ultimately embeds itself deep within the resulting technological materiality of these inventions. Reality shifting, then, meets and blends with mass social movements that require devices in order to fulfill motives and induce the kinds of actions the group promotes. Alternate Reality Games (ARG) bring gaming scenarios and online communities into the real world, sometimes requiring gamers to solve the game using crowdsourcing and other techniques across urban spaces. Reality shifting also involves technologies that do not fall within rigid technical categories. It refers to much more sophisticated devices that are only beginning to emerge, but that claim to augment human movement, memory, senses, or other ontological aspects with virtual components. Future nanotechnological devices are conceived, proposed, and discussed far in advance of their actual emergence, which may never occur. The language surrounding the emergence, however, structures us as much as we structure these new inventions.

Ready to Wear deliberately attends to wearable devices or *wearables*. "Wearability" is a privileged concept for this book for many reasons. Clothing is a great device in its own right. It functions according to needs such as warmth and protection. The wearing of clothing aims never to hinder one during other activities; in fact, it nearly always promotes some other activity. Hip waders function to assist with fly fishing. A Chanel jacket reflects a certain cultural style while also suggesting a particular social context. Yet, few things are as intimate or personal as clothing. One can choose to wear something or take it off according to one's own desires. One can *shift* outfits at will. It is this seemingly simple concept that makes wearable, reality-shifting media unique. By privileging wearability over terms like "mobility," "miniaturization," or even "prosthesis" (all of which are relevant to this discussion), we can better identify a thread or emergent motive embedded in the rhetoric surrounding these technologies. A good cultural exemplar for this point about wearability is Iron Man, of both Marvel Comics fame and recent film depictions (2008, 2010, 2013 slated for release). Iron Man *wears* his superhero powers; he relies solely on his technologically-augmented, armored suit to both save and enable him as a "do-gooder." Iron Man is also simultaneously Tony Stark, the playboy-inventor with a tortured soul, who conceptualizes, designs, and builds the armor as well as a so-called superhero. The suit augments not only his strength and physicality but also his senses and his communicational and mental capacities to the point that he seems superhuman. To *shift* reality, then, is like mythological shape-shifting; it always points to a temporary transmogrification, suggesting transience and perceived human agency.

Wearable media sits midway between media you carry (e.g., laptops, BlackBerrys, memory sticks) and media you become (e.g., devices implanted in the body, future nanotechnological manipulation, prostheses). Of course, this is a continuum because devices you carry become more wearable as people get used to them (e.g., BlackBerry users adopt BlueTooth headsets for talking on the phone). Likewise, nanotech devices at the other end of the continuum that infiltrate the body strive for weightlessness to the point that they *seem* to be a bodily extension. Some ideologies promote the acceleration of this ongoing process. Biohacker Lepht Anonym deals in do-it-yourself subdermal implantations. This transhumanist practitioner remediated a wearable compass using local hardware-store technology and is implanting an adapted version into the skin. Even if Lepht Anonym does not suc-

ceed, the significance lies in the embedded rhetoric in blog posts and writings that the body should not be treated with such reverence, that curiosity and experimentation surrounding machinic integration with the body ought to be recognized as a motive of the subject, rather than a medical authority. Lepht Anonym, who self-identifies as "a faceless, genderless British wetware hacker" uses language differently from previous famous biohackers like scientist, Kevin Warwick or artist, Stelarc. Lepht Anonym's reality-shifting biohack is performed in the name of practical transhumanism, in this case, a person who wants to use technology to change the body. A provocative example for this book is the act of taking a wearable device, a compass, and embedding it into the body using a scalpel. Lepht Anonym's literal act is a metaphor for this transition away from carriability through wearability, approaching implantability or bodily integration. Bodily integration manifests itself in concepts such as DNA storage that tread the line between fact and fiction. Harvard researchers have figured out how to store seven hundred terabytes of information encoded in a droplet of DNA because it can potentially survive for hundreds of thousands of years (Anthony). While *living* DNA can only store information for a short time, the proposition of storing computer data in the living body lingers in the popular discourse, goading people to fantasize about it. One social media respondent asks, "what if your data gets cancer?" (some_guy_said).

Ultimately, this book is not about smartphones, but it would be if smartphones were knitted into winter hats and controlled solely by voice commands (a likely outcome over the next five years!). The drive to make our everyday devices (like smartphones) more wearable is clearly under way. This book addresses how reality shifting, in its capacity as a rhetorical motive, is constantly functioning across contexts, acting upon an audience that is hailed by it. A good, current example is a contact lens display that promises to give us augmented vision in the style of *The Terminator*. Instead of *looking at* handheld devices, we will *wear* see-through displays built into contact lenses. This phenomenon is well under way. Many inventors are working toward this end, including one at the University of Washington who explains his intent:

> Conventional contact lenses are polymers formed in specific shapes to correct faulty vision. To turn such a lens into a functional system, we integrate control circuits, communication circuits, and miniature antennas into the lens using

> custom-built optoelectronic components. Those components will eventually include hundreds of LEDs, which will form images in front of the eye, such as words, charts, and photographs. Much of the hardware is semitransparent so that wearers can navigate their surroundings without crashing into them or becoming disoriented. In all likelihood, a separate, portable device will relay displayable information to the lens's control circuit, which will operate the optoelectronics in the lens. (Parviz)

Relevant here are the assumptions about things we may end up putting over the eye and wearing. The inventor assumes it will be things such as "words, charts, and photographs" just like the Terminator robot he uses to open his article about the technology. Rather than wearing augmented contact lenses, the Terminator had augmented eyes; but, we find it easy to accept that it would be normal and desirable to see "words, charts, and photographs" because this practice appears in the visual culture that surrounds us. While it seems reasonable to use mythology from a film like *The Terminator* to explain the invention, no critical discussion addresses the social, cultural, or embodied implications that arise from such a suggestion.

Reality-shifting media is a cultural phenomenon that is progressively becoming mainstream. Textual and visual representations of them become objects of exchange as network news outlets circulate them as commodities signifying "the future." It is as if whoever reports on the next wearable *device of the future* is also a seer able to read and comprehend the future. Mainstream news sources use the idea of reality-shifting media to sensationalize and make manifest a future that is largely abstract at the moment. The terms *augmented reality* and *mixed reality* are reported in mainstream science magazines signifying the technology's integration in popular discourses (as distinct from the scholarly, technological, or artistic). I led a study to support this claim by identifying various magazines (e.g., *Popular Science*, *Discover Magazine*, *Scientific American*) that draw science enthusiast audiences. An archival search of each magazine was conducted, and articles pertaining to augmented reality were then collected and collated. Another layer was added to the sample by noting the occurrence of terms (*augmented reality* and *mixed reality*) and the numbers of hits returned from database searches. This simple sampling gave me an understanding of the ebbs and flows of augmented reality's prominence in the

broader culture over time. Further, the use of the term "augmented reality" published in magazines and international newspaper articles spiked in 2009 and continued to grow in 2010. I also analyze the content of other social media artifacts including *Wired Magazine* blogs, enthusiast YouTube clips, and blog entries, etc. in order to round out the analysis of the discursive use of the term "augmented reality." It is becoming more obvious that everyday enthusiasts mimic this circulation practice by heralding the coming of reality-shifting devices amongst their personal blog contacts in order to fulfill socially sanctioned digital practices, like being *in the know* or *the first to report on something*. Participatory media practices are key to this book's exploratory process.

Reality shifting must also be recognized as a sensational concept because it involves the body. As a digital culture phenomenon, it implies *computers for bodies* because it privileges bodily responses (inputs and biofeedback). This suggestion that our bodies will wear and interact with computers directly is both desirable and alluring (or simply luring). Computers that operate on this continuum—from carryable, to worn, to being written on the flesh, to becoming of the flesh—need to be considered on a trajectory toward posthuman identity, but what is interesting to me is how this particular continuum toward posthumanism seems already familiar and personal. Our smartphones, iPods, and carryables are participating in the normalization of reality shifting.

The body can also provide a site and surface for critical attention and critical play. Artist Kate Hartman uses the body toward this very end with her wearable inventions, many of which are tuned to the mischievous exploration of the self. Her "Gut Listener" is for literally listening to one's innards. The "Inflatable Heart" is an external wearable organ that can be used by the wearer to inflate and deflate in a playful demonstration of emotions. The "Ear Bender" extends and elongates the ear into space and "literally puts something out there so someone can grab your ear and say what they have to say." Reflecting on these pieces, Hartman says "that we're in this era of communications and device proliferation, and it's really tremendous and exciting and sexy, but I think what's really important is thinking about how we can simultaneously maintain a sense of wonder and a sense of criticality about the tools that we use and the ways in which we relate to the world." Hartman uses the body in conjunction with wearable

components as a medium to parody our condition of social and personal detachment and bemoan a certain loss. With humor though, she also appropriates the physical space around the wearer to create transactions between bodies, spaces, and physical matter in a bid to reconnect. Her "Glacier Embracing Suit" facilitates glacier hugging and intimate interaction with landscapes.

In addition to cultural histories, wearable computers have a linear history relevant to this discussion. The mathematicians Edward O. Thorp and Claude Shannon claim to have first conceived the wearable computer in 1961 (Thorp, "Invention" 4). It was a gambler's shoe computer built for winning bets placed at the roulette wheel. Lured by "the orbiting roulette ball [that] suddenly seemed like a planet in its stately, precise and predictable path," Thorp and Shannon set out to beat the casino through mathematical theorem ("Invention" 4). They used the big toe as the input method and a musical scale to communicate predictions through a tiny speaker worn in the ear. Despite his original ambition to camouflage a computer and actually beat the house, Thorp's fame stems more from his reputation as a (gambling) mathematician. He is the author of *Beat the Dealer: A Winning Strategy for the Game of Twenty One* and several other books that use math to win at gambling. Shannon was a famous academic, mathematician, theorist of entropy, and father of Information Theory, who spent his free time making wild inventions like motorized pogo sticks, turtle robots, and chess-playing machines programmed to make wry comments during moves (Redshaw; Sloane). Thorp's and Shannon's inventions influenced another set of transgressive gamblers, the Eudaemons. Thomas A. Bass writes about how this group of physicists claimed to have beaten the house in 1981 while wearing such devices, launching what he terms "the advent of the wearables age" (1). He also discusses how this collective of collaborators formed Eudaemonic Enterprises "to master roulette, and the gambling proceeds went into the eudaemonic pie, which was to be sliced and served according to one's investment in the company—be it time, money, or ideas" (1). Eventually, this sort of wearable became too dangerous to develop because casino owners hardly ever appreciate deceptive winners. Consequently, as Thorp explains, "the descendants of the first wearable computer were formidable enough to be outlawed," and on May 30, 1985, the Nevada devices law was put into place to end these activities (7).
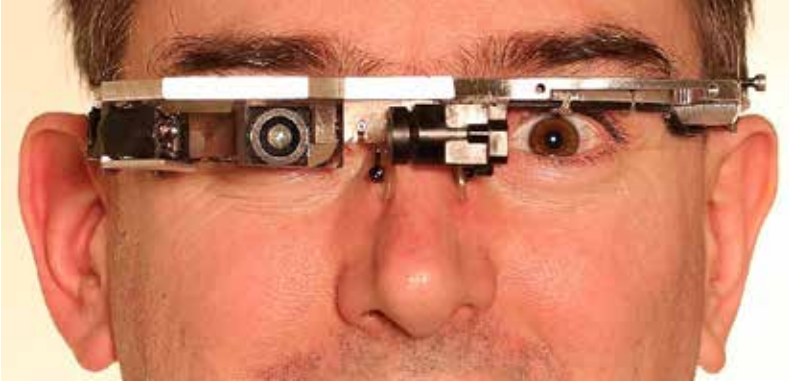
Figure 1.Steve Mann with EyeTap Wearable Computer and Augmented Reality System (1999). This photo is licensed under the Creative Commons Attribution-Share Alike 3.0 Unported license.

Influenced by the Eudaemons, Steve Mann is a famous computer wearer and inventor, who for decades has been making and using wearable computers to promote social justice. He writes, "if the eye is the window to the soul, then our soul is available for anyone to steal" ("Mediated Reality"). He created the WearComp (Wearable Computer) to manipulate and reclaim his visual reality through many different applications. Mann developed a form of mediated reality to block advertising from his field of view that he deemed was stealing his visual attention. With his devices, he interrogates commercial and political hegemonic orders to tip the balance "toward a little bit of fairness on the surveillance superhighway" (Mann with Niedzviecki 168). In their book, *Cyborg: Digital Destiny and Human Possibility in the Age of the Wearable Computer*, Mann and Hal Niedzviecki describe what wearables should do and what they should avoid doing, creating a rich terminology of design goals that guided the emergence of this medium in the 1990s. A staple of Mann's reality-shifting inventions is Eyetap, an eye display that modifies what the eye sees with superimposed computer-generated data that is reflected into the eye (see Figure 1). Mann exposes his mediated life in Peter Lynch's documentary called *Cyberman*. The film illustrates not only the kinds of technologies that Mann wears, but how they become culturally interrogative. Mann also passes the gauntlet to other inventors.

Heavily influenced and assisted by Mann, Rob Spence, a self-described, one-eyed filmmaker, has designed a wearable wireless camera

and transmitter to embed in his blind eye socket (see Figures 2 and 3) (Coxworth). His camera is essentially wearable; it is designed to be popped in and out for maintenance. Clearly, Mann's motive for wearable technology has become instantiated in the motives for Spence's device. During one television interview, Spence says "so we have big brother and surveillance cameras and I'm sort of positing myself as a little brother who is shooting from below as some kind of response" ("Team Eyeborg"). When asked during a YouTube posted video why people resist his invention, he remarks: "[they are] the most human part of the body, your eyes[;] so if all of a sudden you change that private human part of the body that you [use] to interact with somebody . . . in fact what you have is a window to the goddamn Internet, then there's a couple of levels of apprehension and fascination with that" ("Daily Planet"). Spence's "The Eyeborg Project" is also interesting because it spawns so many bits and pieces of communication that linger in the discourse and drive motives onward. *Wired* bloggers write about him as a potential "lifecaster" (Ganapati). Spence has made many television appearances. He blogs. He circulates YouTube videos on ideas about surveillance, bionic body parts, and the Eyeborg technical components created by his team partner, Kosta Grammatis. Working with video game company Square Enix, he has produced *Deus Ex: The Eyeborg Documentary*, which charts Spence's real experiences alongside Adam Jensen's, one of *Deus Ex*'s fictional game characters who uses a prosthetic eye. For many years before completion, Spence's wearable eye did not work; it was a figment of sincere desire, an ambition integrated with social media, popular culture, and cinéma vérité genres.

Traces of influence weave themselves through the discourse, inculcating and prodding inventions toward shared goals. Despite the common belief that wearables evolve from ever-shrinking laptop computers, these narratives demonstrate their unique origins; they evolve from desire. These early strategies signify the desire to subvert established orders like laws of math or casino profit systems. They signify the desire to overcome aspects of perceived physical impediments. As well, they reflect a desire to avoid state-sanctioned technology that mounts rapidly according to its own pressures. Consequently, subversion marks the discourse of early wearable computers. These inventions inject a sense of defiant individuality into the growing and evolving discourse that constantly unfolds.

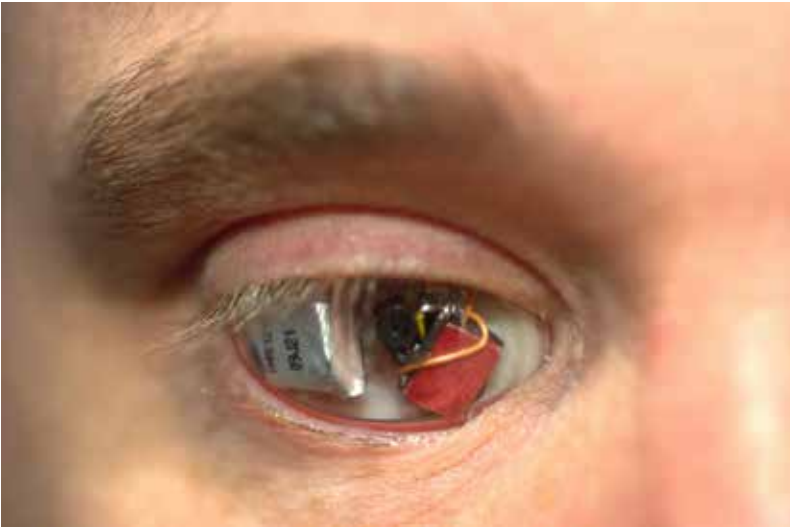Figure 2. Rob Spence holding his Eyeborg device. Photo Credit: Rob Spence.

Figure 3.Rob Spence wearing his Eyeborg device. Photo Credit: Rob Spence.

Mann and Spence are also spurred onward by governments that are simultaneously inventing reality-shifting media. LifeLog is a great example. Emerging in 2003, it was a brainchild of the Defense Advanced Research Projects Agency (DARPA), which is the central research and

development organization for the United States's Department of Defense. LifeLog was an application that sought to record "life" (Gage). It aimed to amass all the texts of a person's life and store them in a life diary. Using wearable cameras and sensors, the LifeLog human subject was to collect several categories of information, including everything he or she sees and hears, geographical locations, health information, computer-based communication, real world communication (i.e., TV shows watched, faxes read, etc.), and the voice content of every conversation experienced. Ultimately, LifeLog was too intimidating. *The Christian Science Monitor* summarizes the general media reaction to LifeLog as a "Post Digital Big Brother":

> If George Orwell read the Pentagon's proposed new "Super Digital Diary" (a.k.a. LifeLog), he wouldn't just turn over in his grave. He'd have himself exhumed, cremated, and his ashes transported in a dhow to be dumped in the Indian Ocean somewhere between Mogadishu and Mombasa. After all, Orwell just had to deal with a pre-digital Big Brother. (Regan and Bencivenga)

When the project was axed by DARPA, one *Wired Magazine* journalist wrote: "LifeLog's backers said the all-encompassing diary could have turned into a near-perfect digital memory, giving its users computerized assistants with an almost flawless recall of what they had done in the past. But [. . .] LifeLog could [have] become the ultimate tool for profiling potential enemies of the state" (Shachtman). Interestingly, LifeLog still lingers in the discourse as an idea or a constellation of ideas; it still has value as an invention, which influences current augmented memory applications striving for similar goals (SwingDrama). Augmented memory will be discussed in a chapter of this book.

These origin stories for wearable computers stress motives, beliefs, assumptions, transgressions, and goals amid the conditions (e.g., technological, economic, etc.) that alter them. One facet of this book is to challenge rhetorical motives embedded in technical terms, like *augmented reality*, and make salient their social and political assumptions as well as the kinds of rhetoric that linger in their evocations. "Reality shifting"—deliberately a gerund rather than a noun—is a catchall term to describe this kind of phenomenon; but, it is also a term that suggests ongoing scrutiny of the meanings it instigates. This book focuses on the communicative aspects of wearable devices and

reality-shifting interfaces in their conceptual, social, cultural, political, and, most importantly, rhetorical contexts. It analyzes the cultural artifacts (i.e., novels, films, other media experiences, etc.) that drive us to embrace them, as well as design-based writing by inventors and governments. Put simply, the intent of *Ready to Wear* is that it focuses squarely on motive.

Other writers work along similar lines. Vincent Mosco's take on technology in *Digital Sublime: Myth, Power, and Cyberspace* is illuminating here because he identifies the motive inherent to digital artifacts as myths:

> Useful as it is to recognize the lie in the myth, it is important to state at the outset that myths mean more than falsehoods or cons; indeed, they matter greatly. Myths are stories that animate individuals and societies by providing paths to transcendence that lift people out of the banality of everyday life. They offer an entrance to another reality, a reality once characterized by the promise of the sublime. (3)

For Mosco, motive lies in the myth when dealing with digital invention. He is concerned with the transcendental power of stories that spur people toward adopting technologies slung atop the backs of myth. Mosco, however, refuses to adopt the purely scolding, dystopian finger that Paul Virilio so quickly raises, for example, when pointing out the *lie* or the *alibi* that so many inventions engender. Virilio writes of "[a] black hole of Progress into which has now fallen this whole philanoia, this love of madness on the part of the sciences and technologies, which is now seeking to organize the self-extermination of a species that is too slow" (*Ground Zero* 15). Virilio understands technological emergence as if it is in direct cahoots with resulting accidents (e.g., if you invent a plane, you invent a plane crash). Relevant too is Mark Andrejevic's view that digital technology is always bound to the "digital enclosure," which he sees as "the creation of an interactive realm wherein every action and transaction generates information about itself" (*iSpy* 2). He points to the process of enclosure, carrying with it the condition of surveillance. As mobile devices proliferate, they conform to surveillance as a built-in condition of use. Every transaction leaves behind a digital trace. Even the most seemingly innocuous activities demand acquiescence to the digital enclosure. We can participate in online forums, but we must leave behind email ad-

dresses, full names, and secret password reminders (often revealing our mother's maiden name or our birth date) in order to join. This process helps us participate, but it also tags us as participants, making identification conditional to participation. Reality-shifting media, like any digital media, emerges within preexisting contexts that need to be recognized. Important also to this discourse are the writings by inventors who seek to justify the things they make and propose. Carolyn R. Miller explores the rhetoric of technology using *kairos* to get at the "suasory force" of opportunistic moments in the present that rhetors use to justify or forecast technologies of the future. She looks at the enterprise of technological forecasting generated by urgencies of opportunity as well as threat, which create a powerfully goading discourse (91).

This book wades into similar territory. Despite the common term *human-computer interaction*, much technology goes unexplored as to its impact on people and, more specifically, the concepts and embedded meanings that affect humans. This book will analyze the ongoing rhetorical friction between technology that strives to augment aspects of humans and language *about* technology, which often results in both humanizing and dehumanizing textual constructions as well as material inventions. In previous work, I relied on the term *human-centricity* to structure a value system that considers the situation of humans in relation to other entities, such as wearable technology, or potentially hegemonic orders like governments or commercial entities (Pedersen, "Semiotics;" "Dehumanization;" "Mobility"). I have developed the model further in this work by using two opposing terms—*humanize* and *dehumanize*—because, as verbs, they suggest an active process of persuasion, a rhetorical process. To *dehumanize* means to deprive of humanness. Dehumanizing artifacts suggests violence, a stripping away of human qualities. To *humanize* implies projecting or assigning humanness onto a thing or an idea. These working terms provide a means to treat technology within a context or the complex ecologies that bring it into existence.

By using *humanize* and *dehumanize*, this research relates to studies of posthumanism, a philosophical concept that explores and debates the possibility and desirability of evolution beyond the notion of human. Postmodern criticism has been concerned with the posthuman for some time because the term questions assumptions underlying the human as a category, or the end of the category and all the

conventions made concerning what so-called humanity is and is not. Another way to understand posthumanism is to acknowledge that humans operate in conjunction with wider contexts. Byron Hawk writes, "the death of man is not anti-human but the collapse of an isolated, substantive image of the subject and the emergence of viewing humans in the complex context of nature, technology, and language" (141). Posthumanism probes ideas like (im)mortality, invincibility, and embodiment. Further, some see transhumanism as a positive step in the evolution toward posthumanism. Lepht Anonym lives according to the term "transhumanist biohacker" and identifies with writers and practitioners like Nick Bostrom, Ray Kurzweil, and Kevin Warwick in her pursuits to alter her body on her own terms, defying categorical and moral stereotypes that attempt to prevent her (re)design of her body. Her bodily manipulations with technology might be viewed as humanizing her experience because her rhetorical justification for doing it does not include diminishing her selfhood. Others are critical of transhumanism; Francis Fukuyama points out, "as 'transhumanists' see it, humans must wrest their biological destiny from evolution's blind process of random variation and adaptation and move to the next stage as a species" (42). Fukuyama and others are threatened by the erosion of humans' so-called natural condition.

In a previous work, I brought N. Katherine Hayles's notion of dream and nightmare posthumansim (*Posthuman* 5) to the discourse of wearable computers to frame this friction between a view of technology that is seductive, reckless, and dehumanizing in its claims (nightmare posthumanism), and a view of technology that recognizes the finitude and material conditions under which humans operate (dream posthumanism) (Pedersen, "Dehumanization"). More recently, Hayles, in coming to terms with transhumanism, defines it as "an international movement dedicated to the proposition that contemporary technosciences can enhance human capabilities and ameliorate or eliminate such traditional verities as mortality. It holds that human evolution is incomplete and, moreover, that we have a responsibility to further our evolution through technology" (*Wrestling* 217).

In writing this book, I have come to recognize and explore the fact that the *concept* of humans is integral to reality-shifting media, even though the definition of human is a site rife with academic debate that is nowhere near any sort of consensus. Wearable computers are unique because by definition, they are designed and prototyped to be

worn by humans. They are constantly traversing the delicate tightrope concerning how they will affect human wearers physically, personally, and ontologically. More so, they lead one to question how their designs will become integrated within constant technological, medial, environmental, material, bodily, and ontological contexts surrounding wearers. In her newer work, *How We Think: Digital Media and Contemporary Technogenesis*, Hayles posits a theory of technogenesis, which is summed up as "the idea that humans and technics have co-evolved together" (10), and from a cognitive standpoint she states, "we think through, with and alongside media" (1). She promotes the idea that technologies and humans coexist and codetermine one another inside of technogenetic feedback:

> Contemporary technogenesis, like evolution in general, is not about progress. That is, it offers no guarantees that the dynamic transformations taking place between humans and technics are moving in a positive direction. Rather, contemporary technogenesis is about adaptation, the fit between organisms and their environments, recognizing that both sides of the engagement (human and technologies) are undergoing coordinated transformations. (81)

More so than other forms, reality-shifting media—ambient, personal, dynamic, and reactive to the vital aspect of humans by definition—throw this ongoing evolution, technogenesis, into sharp relief.

I have continued to devise my own model to attend to reality-shifting media. Regardless of whether we *are* or *are not* posthumans or transhumans—or humans for that matter—we are currently in the process of negotiating a language for our emerging technological devices, many of which directly affect ways that we parley with our existence. Influenced by Martin Heidegger, Hawk explains that "rather than technology causing effects or humans determining purposes, technology and human combine with many other elements in the environment to create conditions of possibility that suggest potential futures" (172). We need to address the conditions for how our devices are framed and invented within what Hawk, David M. Rieder, and Ollie Oviedo name "a constellation of relationships" (xix).

To call a technology humanizing or dehumanizing is not a maneuver that seeks to deny complex relationships. It does not deny the agency of non-humans. However, it provides a rhetorical model to deal

with a rhetorical dilemma. Wearable computers and augmented reality technologies are designed to work with and for (so-called) humans. Future inventions are proposed, justified, negotiated, and celebrated in language before we touch them. We need to hold technical artifacts to a critical model of scrutiny that can function in complex ways.

Many artists explore technology as humanizing and dehumanizing. Marcel O'Gorman, for example, creates art installations dealing with "necromedia," exploring the intersection between death and technology or, as O'Gorman claims, "the collusion of death and technology." During his *Dreadmill* performance, O'Gorman delivers a lecture while running on a treadmill that powers his multimedia equipment. He calls *Dreadmill* "a visceral provocation to stop denying this finitude [of the human body], and to integrate the body more fully into digital environments." O'Gorman paradoxically humanizes a digitally-enhanced event, a presentation, by using his own moving body, his muscles, for power. Yet, he demonstrates how we are dehumanized by technology; he enslaves himself to his laptop for the duration of the event. We hear his breath shorten and imagine his body on a trajectory of deterioration. In ultimate terms, the treadmill *uses* O'Gorman, wears him out; the performance itself cannot exist without its creator's present and laboring body.

Taken as a paradoxical rhetorical model, humanize and dehumanize work in conjunction with a theory of circumference. Usually associated with dramatistic analysis, Burke's "circumference" measures the orbit around which humans choose to define acts; it establishes a context (*Grammar* 77). By specifying the circumference, one can more accurately reveal complex motives. For example, Spence lost his sight as an adolescent when he was trying to shoot a gun on his grandfather's farm. If we take Spence's act as a center and define his actions within different circumferences, motive changes. Within a circumference defined by his existence (namely, his symbolic treatment of his existence), his Eyeborg Project seems humanizing. The creation of the eye camera suggests a bodily restoration within the context of physical loss, where Spence accommodates his condition by using the invention. Within a broader context (i.e., a wider circumference), Spence also envisions the eye camera as an anti-surveillance tool, which might humanize a situation whereby people have lost ground to commercial or state surveillers. However, other motives feed the discourse. In some reports, Spence is framed as a "lifecaster" with plans to broadcast what

he sees on the Internet, suggesting a global act of projection; in this configuration, he plans to "attach" an aspect of his private life to a public network (O'Brien). By widening the circumference of the context to lifecasting on the Internet, Spence's act can also be discussed as dehumanizing, if the terms that frame his act are a reduction. More simply put, one could ask, does a digital life significantly minimize the depth, breadth, and experience (amongst other aspects) of a lived life in its claims *to be* a life? Interestingly, Spence dispels this motive on his blog stating that "I am -not- a lifecaster" ("About me"). However, neither Spence nor the actual technology solely characterizes his motive. The motive embedded in his acts that are instantiated in certain contexts across the vast discourse that circulates news about him, can be viewed as humanizing or dehumanizing.

This book is largely about the beginnings of reality-shifting media and their emergence within social, political, and cultural contexts or ecologies; however, it also lays stress on the rhetorical motive that actually drives emergence. In the famous "Hot and Cool Interview," Marshall McLuhan offered the insight that "when we invent a new technology, we become cannibals. We eat ourselves alive since these technologies are merely extensions of ourselves. The new environment shaped by electronic technology is a cannibalistic one that eats people" (67). Here, the word "environment" is key to this quote rather than the more sensational notion of cannibalism. Media and humans are of the same environment. We are more than simply subject and object of media emergence; rather, we share the conditions of emergence alongside technology. In this book, I suggest that we implicate ourselves in the designs of inventions by laying bare our motives at the early stages of the technologies' development. In one sense, this call for participation suggests that everyday people operate to an extent as agents in the process of media design, even though I acknowledge that some media theorists contest the possibility or desirability of that stance (Andrejevic; Kittler; Virilio *Information*).

While there are many books focusing on new mobile media, and some specifically on mobile communication, few existing books treat new media emergence rhetorically. This book makes heavy use of Burke's notion of rhetoric (*Grammar*; *Rhetoric*; "Poem") because of its power to disclose the kinds of hierarchical manipulation in the language that precedes these inventions. Glenn Stillar comments on the value of a Burkean model:

> Rhetorical analysis, in a Burkean perspective, focuses on our
> dual relation to symbolic action and symbolic systems. That
> is to say, symbol systems enable us to construct a world of ex-
> perience and orientation. Through symbols, we actively shape
> and interpret worlds and orient ourselves to those represent-
> ed worlds and the other agents in them. They constitute our
> ways of knowing and acting in the world. At the same time,
> the symbol systems and symbol-using patterns of our cultures
> define us as social agents. They constitute our ways of being
> in the world. (61)

Real people act through "symbolic action" and real people are acted
upon by "symbol systems." We construct the terms of our existence
and "actively shape" the worlds of our experience through symbolic
action. Simultaneously, symbol systems act upon us with commen-
surate agency. They enact boundaries and draw human action under
their domain and control. This "dual relation" of both *acting* and *being
acted upon* constitutes our epistemology and our ontology.

To achieve the goals outlined for this book, I construct a model
of theoretical resources by adapting Burke's terms for "order" (*Rheto-
ric* 183–89)—the "positive," "dialectical," and "ultimate"—as a triad,
and relate them to key rhetorical events and instances that occur in
the language of emergence surrounding inventions. Burke's triad ex-
poses the transformative nature of rhetoric. It offers three orders, or
hierarchies, namely, a positive order instantiated by terms of a material
nature, a dialectical order instantiated by terms referring to the realm
of ideas (i.e., clash and compromise between signifying entities), and
an ultimate order instantiated by terms that act as a seemingly sover-
eign, organizing, and authorizing principle over the whole set of terms.
Transformation occurs as each order conveys the social, consequential
functions of texts within contexts from one order to another.

Burke's first term for order, the "positive," involves acting through
naming. He writes, "[f]irst, we take it, there are the *positive* terms. They
name par excellence the things of experience, the *hic et nunc*, and they
are defined *per genus et differentium*" (*Rhetoric* 183). By this, he means
that positive terms define things that have a sensory existence, such as
trees, houses, colors, and sounds. Human physical acts also instanti-
ate positive orders. When we walk around trees instead of bumping
into them, we act; but, we also signify in terms of the positive order. A
dodge around the tree, an action, reveals recognition of the tree's "vis-

ible and tangible" existence. If we did not recognize the tree's presence as meaning (i.e., a *positive* sign), we would bump into it. Our bumps and dodges suggest a *positive* (re)action to the material world. Virtual interfaces that deal especially with locative media do so by way of this order of terms. For example, when a person walks, a computer device tracks her location on a global positioning system (GPS); wearing it translates her physical movement to positive signs in language. By way of this locative media feature, the person communicates with her own mobility by signifying according to a positive terminology that deals with embodiment and movement. By augmenting her physicality, she moves in new ways because she will sense the world in new ways.

There is nothing new about using a device that reads an aspect of the physical world that one normally cannot read. Thermometers read exact temperatures according to the Celsius or Fahrenheit scale. Carbon monoxide alarms read levels of a poison humans cannot smell or see. Glucose monitors test blood for diabetic people who cannot sense their own glucose levels. Wearable computer inventor Mann writes about his desire for stroboscopic vision and the facility to freeze motion. He claims that his invention gives him the ability to "count the grooves in the tread" of a wheel spinning at a hundred kilometers per hour (Mann with Niedzviecki 3). Yet, quite mundane applications emerge. One augmented reality application undergoing emergence will help factory workers with order picking (Schwerdtfeger and Klinker). Workers visualize floating virtual arrows on their transparent head-mounted display, suggesting an item to be picked up when assembling a part. (It is as though the augmented reality device nudges the worker in the right direction. *Here, pick this one.*) These workers act physically according to a shared positive terminology exchanged with the computer. They make a quick *this* or *that* selection. In a sense, both of these kinds of reality-shifting inventions instantiate the positive order with these readings.

Of course, reality-shifting interfaces go beyond physical augmentation. They offer the opportunity for debate, interaction, conflict, and communion with other subjects across social networks. Burke writes of another set of terms that instantiate a dialectical order:

> Here are words that belong, not in the order of *motion and perception*, but rather in the order of *action and idea.* Here are words for *principles* and *essence.* [. . .] Here are titular words. Titles like "Elizabethanism" or "capitalism" can have no posi-

> tive referent, for instance. [. . .] You define them by asking
> how they *behave*; and part of an expression's behavior [. . .]
> will be revealed by the discovery of the secret modifiers im-
> plicit in the expression itself. (*Rhetoric* 184–85)

One cannot pick up and hold "capitalism" for there is no positive em-
bodiment of it in the world. It is an idea dependent on "secret modi-
fiers" and given assumptions, which are goading. The dialectical order
involves choice and binary relations. It entails interaction between op-
posing terms that push and pull for resolution in texts.

Recognizing the dialectical order operating through reality-shift-
ing interfaces provides a model to begin to chart our expectations
for our devices. To be interactive, a reality-shifting interface must or
must seem to offer people the capability to make meaningful choices
(Azuma 356). Many early wearable computers sprang from very per-
sonal desires for interaction with different systems. The shoe-comput-
er gamblers were famous for beating casinos in the 1960s and 1970s
(Bass; Thorp, "Invention"). They claim they did not strategize to *win
the money*; rather, they were driven to beat the roulette wheel, turning
something unpredictable into the predictable, to alter systems of in-
teraction on a grand scale. Yet, as our current mobile communication
devices promote a more liberated, socially-integrated subject who can
communicate in a plethora of new ways, they also threaten to bind the
subject. We might limit ourselves to an existence of constant location-
based consumption and state-controlled monitoring, increasing the
digital enclosure that Andrejevic signals (*iSpy* 2). Identifying terms as-
sociated with the dialectical order enables us to reveal value systems,
humanizing and dehumanizing, surrounding these devices and the
practices that surround them.

Burke's third order, the "ultimate," constructs the impression that
hierarchies are inalienable:

> Now, the difference between a merely "dialectical" confront-
> ing of parliamentary conflict and an "ultimate" treatment of
> it would reside in this: The "dialectical" order would leave
> the competing voices in a jangling relation with one another
> [. . .] but the "ultimate" order would place these competing
> voices themselves in a *hierarchy*, or a *sequence*, or *evaluative
> series*, so that, in some way, we went by a fixed and reasoned
> progression from one of these to another, the members of the

> entire group being arranged *developmentally* with relation to one another. The "ultimate" order of terms would thus differ essentially from the "dialectical" [. . .] in that there would be a "guiding idea" or "unitary principle" behind the diversity of voices. (*Rhetoric* 187)

The *ultimate* offers the seeming authority of a higher order to quell the divergence. Ultimate vocabularies propose more than a compromise; they generate a seeming unity in contexts through functions like sequences, series, relations, arrangement, reason, and design. They operate as if there is no challenge to them, like a principle, which is a fundamental law or primary doctrine. An obvious example of an ultimate vocabulary is a code of law, like *Criminal Law*; we *live by* and *according to* these laws because we fear incarceration.

Metaphor is another powerful rhetorical resource. Its manipulative quality lets a rhetor take control over "perspective" and have something seen "in terms of something else" (Burke, *Grammar* 504). It is vitally important to the framing of science and technology. As Marita Gronnvoll and Jamie Landau so aptly put it, "Historically, metaphors abound in discourses of science even as science has often been regarded as non-metaphorical" (46). Metaphor is even more vital when it comes to reality-shifting media because a unique terminology has not yet materialized to explain the new phenomena and their practices. *Metapherein*, of the Greek, is a combination of meta (transcendence) + pherein (to bear), as in, to *bear* a burden, or a heavy load. Metaphor suggests a meta-conveyance and it exhibits the potential to function within Burke's triad as a mediator of redounding relations. For example, the sentence, *she walked home* is of the positive order. It deals with the material, sensorial world and the act of walking within a physical space. Once you add a metaphor, *she danced home*, a transcendence occurs. The sentence still enacts a positive order as the verb still suggests physical movement. However, the verb *dance* indicates a mood, joy. *Dancing home* is the opposite of *lurching home* or *dragging oneself home*; a dialectic appears, creating a scale between happiness and its opposite, misery. Metaphors can function to instantiate an ultimate order. In *she danced home*, the *doing* of the dance is subsumed by the concept of home itself, as a constitution of family values and norms that deflects questions over her act. Transformation to an ultimate order often demands knowledge of the context in which the sentence exists and that

context might draw on cultural, political, juridical, or other ideology inherent to it.

Metaphors do not only function within single statements of written language or single units within other modes like one picture or one line in a song. Metaphoric systems can be extensive; they can cluster and contribute to terminologies that are manipulative. Writing about rhetoric in the foreword to his book, *The Terministic Screen: Rhetorical Perspectives on Film*, David Blakesley explains that rhetoric functions "as a filter or screen, enabling some things to pass through clearly, obscuring or repressing others" (2). Joseph R. Gusfield further elaborates how this process works through "terminological clusters":

> Seeing "*in terms of*" is the clue to Burke's continuous focus on the limits of specializing single terminologies. When we think and perceive we do so by reducing something to something else. It is in that process that the reduction occurs. Explanations are explanations "in the terms of" something else on which the explainer draws, be it God, nature, capitalism, or the unconscious. Every explanation possesses a "circumference." We place the object of our concern within a setting of particular scope. It indicates where the explanation stops; where it satisfies the terminological cluster available. (16)

We can also see metaphor function within the dynamic milieu of "specializing terminologies" that rhetors use and cluster for persuasive ends. Metaphors are first and foremost a "seeing in terms of." They are selections, deflections, and reflections of reality. A cluster of metaphors might explain the unfamiliar in terms of the familiar, the mundane in terms of the fantastic, or the unknown/unknowable in terms of the knowable. Metaphors are also evocative. A cluster might offer the opportunity to explain a concept and expand meaning in a manner that was not possible previously. At the same time, metaphoric clusters imply "reduction" (Burke, Grammar 97). Reducing the world to a cosmology, a world explained in terms of *words about worlds* is a reduction (96). Metaphoric clusters can both intensify and *de*tensify depending on the extent to which subjects *live according to* them (e.g., metaphoric acts involved with a ritual, like an Easter egg hunt are more intense to the participating child than to the spectator adult). Metaphors also work according to "circumference." They operate within expanding and contracting peripheries of terminologies that extend

or limit their possibilities. If the "orbit" of an act includes a concept of the supernatural (77), that act might be very different than if the orbit did not extend beyond a schoolyard or courtroom, for example. Reality-shifting discourses make heavy use of metaphor and clusters of them in order to both convey basic information about science and also to make readers acquiescent to them.

By exposing the workings of the triad in texts, one can expose the transformative nature of language surrounding reality-shifting devices. One British researcher, Sir John Pendry, explains his invisibility "cloak" invention by noting: "It's theoretically possible to do all these Harry Potter things, but what's standing in the way is our engineering capabilities" (Bridges, "Scientists Aim"). J.K. Rowling's fictional boy wizard personifies not only the way the invention might function but also the kind of desire it generates. It signals thoughts of magic and heroism. However, Pendry's description of the invention functions at a persuasive level that goes beyond literary allusion as a technique. Most notably, it instantiates the Burkean triadic rhetoric that orders our attitudes toward the invention and, ultimately, drives us toward accepting it through a looming sense of imminence.

First, the invention is rhetorically structured as a simple "cloak," a covering that we can all envision as a convergence of material selections (e.g., color, textile, weave). This metaphoric reduction to a cloak sweeps away the actual complex nanotechnological process of developing metamaterials for invisibility and offers a metaphor in positive terms in its place. Here, the positive order functions as a ruse of over-simplification—*just think of it as a cloak*. Second, the dialectical order offers debate. In describing the emergence of the invention, Pendry's phrase introduces a conflict over our "capabilities" and whether *we* (as a historically-distinct culture) are suitably apt to fulfill such an invention. He uses the term "possible," which also delicately refers to the *impossible*. The dialectic he creates is not whether the invention will exist or not, but whether *we* will gain the knowledge to bring it to light. He lays the task on *our* shoulders. He hints at human ineptitude, which we take as a given when it comes to invention. Strategies of dehumanization like this one are not difficult to accept; it seems normal to assume human fallibility. The dialectical order goads us with self-doubt. Lastly, the most powerful rhetoric is that which is most reticent. Referring to *the way* (i.e., "what's standing in the way") implies that the invention will certainly exist in the future. Through

the ultimate order, the desire to be invisible is assumed; we simply have to *get there* along this predetermined *way*. This last ordering principle in the language—the implication that invisibility is an imminent destiny—alters our attitude toward the invention the most. The dialectic over human capability is quelled; the *way* toward the invention has been defined. Invisibility is imminent.

The utility of the rhetorical triad is not to label words as "positive," "dialectical," and "ultimate," but to realize the developmental relationship that goes on among these terms. One term leads into the other and, in effect, completes it:

> In an ultimate dialectic, the terms so lead into one another that the completion of each order leads to the next. Thus, a body of positive terms must be brought to a head in a titular term[,] which represents the principle or idea behind the positive terminology as a whole. This summarizing term is in a different order of vocabulary. And if such titles, having been brought into dialectical commerce with one another, are given an order among themselves, there must be a principle of principles involved in such a design—and the step from the principles to a principle of principles is likewise both the fulfillment of the previous order and the transcending of it. (Burke, *Rhetoric* 189)

Burke uses the terms "fulfillment" and "transcending" to describe the "step" from one order to the next. Each order must be seen *in terms of* the other orders. In order to construct this rhetoric of imminence as an ultimate order, the language needs the positive and the dialectical as stepping-stones. With varying degrees of reticence, all of the reality-shifting concepts analyzed in this book exhibit a progression across the rhetorical triad in the language that informs them. They signal fantastical thoughts and ambitions, which generate rhetorical "What if?" momentum. However, to counter utopian visions, all of these technologies undergo emergence through scientists who both leverage fantasy and dismiss it while justifying the technology, often under the guise of dehumanizing language. Most powerfully, though, the technology often mysteriously appears as inevitable, as utterly imminent.

The recognition of this powerful sense of imminence embedded in the language and culture around these inventions, driving their emergence, contributes to a critical theory phenomenon explored by

several cultural and media theorists, albeit with differing orientations and agendas. As a revision to his widely accepted notion of *remediation* (Bolter and Grusin), Richard Grusin posits the term *premediation* to explain media emergence ("Premediation"). While new media refashion old media (i.e., remediate), they also premediate far future media technologies long before they exist. As is the case of most science fiction artifacts, *The Terminator* series of films operates to facilitate premediaton. Intensified by post 9/11 anxiety, current events are also thoroughly premediated before they occur. Grusin's example is the U.S. invasion of Iraq that was explored so thoroughly in mass media through visualizations on the news that everyday citizens were not surprised when the actual invasion occurred ("Premediation and the Mediaphilia"). Media do not predict one outcome; they play out multiple outcomes to the point that nothing seems new when it happens. Likewise, Greg Elmer and Andy Opel write about preemptive logics in their book *Preempting Dissent: The Politics of an Inevitable Future.* The deployment of surveillance technology, tasers, and security tactics preempt public activity, eradicating dissent before it materializes.

Nanotechnology serves as a rhetorical enticement legitimizing the unknown in media discourses. Colin Milburn addresses "nanorhetoric" and "nanowriting" in Hayles's collection *Nanoculture: Implications of the New Technoscience*, where he refers to the "operatic excess of nanowriting—that genre of scientific text in which the already inevitable nanotech revolution can be glimpsed" (114). He writes in his own book, *Nanovision*:

> Nanotechnology entails a way of seeing, a perspectival orientation to the world, that operates through a productive dynamic of blindness and insight. It produces a blind spot, a wall, a veil, a black hole, or a barrier and therein discovers a scission—between present and future, between human and posthuman, between science and science fiction. But at the same time, even in discovering its own blindness, it sees through it toward the beyond. It breaches the wall, breaks the barrier, lifts the veil, and voyages into the black hole. It is a way of seeing that lyses the membrane between the technological present and the nanotechnological future. (13)

Nanotechnology is a rhetorical apparatus used to create a present barrier, a blind spot concerning the future and what it holds, only to simultaneously claim a "spectacular insight" into the future, a "nanovision"

(13). When instantiated in language concerning augmented reality and other reality-shifting media, however, I argue that nanotechnology assumes the role of a clairvoyant with little or no explanation of the future that it claims to see. Nanotechnology seems to operate as if it is predestined, making it fruitless to question any declaration it makes.

I unite together these concepts—premediation, preemption, vision, and inevitability—to understand the rhetoric of reality-shifting media emergence. I adopt the term *imminent* because it best characterizes the sense of looming closure inherent to the language of reality shifting. (*We will read people's minds. We will live forever. We will be invisible.*) Premeditation implies a degree of forethought or will; *imminent* is more appropriate here because it suggests a blind march onward, an unquestioning belief that the future, already laid out, presupposes every act we perform. The rhetoric of imminence operates as an ultimate hierarchy that rhetors often use as a given that is simply accepted, a fallback position that is always already palatable to society when it comes to technology. *Ready to Wear* begins the process of unraveling this very assumption using rhetoric as the central method of disentanglement.

In this book, each chapter explores reality-shifting phenomena under a particular theme. Each addresses a current concept alongside a far future or exemplary one to address the language surrounding the device. Chapter 1 ("Mobile Devices, Movement, and Myth") treats the concepts of mobility and wearability and the ideologies that fuel reality-shifting inventions. It addresses the "mobile turn" in culture by discussing head-mounted displays, digital tattoos, and an exemplary, far future technology, teleportation. The concept of moving (rather than actual movement) is key to the discussion for this chapter.

Chapter 2 ("Transparency, Nanotechnology, and the Rhetorical Justification for Invisibility Inventions") carries on the discussion of invisibility and addresses the language surrounding invisibility inventions. It examines a large collection of news articles that report on advancements by several key inventors around the world. Once technical artifacts actually exist and are reported upon, they are difficult to change. They become intimately intertwined with digital ecologies and digital "constellations" (Hawk, Rieder, and Oviedo) that surround us. This chapter argues that we ought to meet ambitious reality-shifting experiences with a critical eye, and, we ought to avoid dehumanizing intentions and what Hayles calls "fantasies of unlimited power and disembodied immortality" (*Posthuman* 5) when it comes to justifications for technology.

Chapter 3 ("Interactivity, Wearability, and the Rhetoric of Proposed Brain-Machine Interfaces") discusses a view of wearable reality-shifting media in terms of spontaneous interaction with other people, physical environments, devices, Web media, as well as the wearer herself. However, it cautions and considers that mediated social interaction is a contested site vulnerable to "takeover" by hegemonic ordering. As our current mobile communication devices promote a more liberated subject, they also threaten to bind the subject. We might limit ourselves to an existence of constant location-based consumption and state-controlled monitoring. Future inventions need to be considered with this issue of limitation in mind.

Chapter 4 ("Augmented Memory, Digital Life, and Computers that Promise to Remember Everything") addresses augmented memory, a popular concept associated with wearable media. Many inventors are creating memory devices for humans. The chapter argues that inventors' discourses justify augmented memory according to a dehumanizing rhetoric of need (i.e., we need better memories so we need an augmented memory), leading to a machine-centricity embedded within these justifications. By dehumanizing the notion of memory, inventors' discourses leap toward an extreme technological solution by proposing that our devices remember for us. They deliver these conclusions in "ultimate terms" to convince us of this need. This chapter uses Burke's theory to reveal this rhetoric of need in the language surrounding the inventions. The chapter also explores film depictions of the medium. Springing from its ecological relationships with prior media forms, augmented memory portrays itself as both a medium promising utopia and also one signaling a terrible fear of dystopian conclusions. The MyLifeBits Project serves as the exemplar.

Chapter 5 ("Carryable Technologies, Participatory Culture, and Rhetorical Transformation") deals with the reach of mobile digital culture and its role in leveraging reality-shifting media today. It explores new mobile, digital practices through Apple Computer's iPod and iPhone advertising campaigns. It addresses identity building within news articles that emerged in the summer of 2007 when the iPhone was *not* released in Canada, structuring a rhetoric of the *excluded Canadian*. Taken together, the two parts make the point that a global event, and a globally-structured subject, can directly affect device-driven, mobile culture actively occurring in a local context.

Bibliography

Works Cited

"AH 2012 Call for Papers." *Augmented Human International Conference*. Web. 3 May 2012.

Ahmed, Murad. "I Can Move Things with my Mind." *The Times* 4 February 2010: 38–39. Print.

Amft, Oliver, and Paul Lukowicz. "From Backpacks to Smartphones: Past, Present, and Future of Wearable Computers." *IEEE Pervasive Computing* 8.3 (2009): 8–13. Print.

Anderson, Fiona. "iphone woes." *The Vancouver Sun* 14 July 2007: D1. Print.

Andrejevic, Mark. *Reality TV: The Work of Being Watched*. Lanham, MD: Rowman & Littlefield, 2004. Print.

—. *iSpy: Surveillance and Power in the Interactive Era*. Lawrence: U of Kansas P, 2007. Print.

Anthes, Gary. "Skin-Like Electronic Patch Unveiled." *Communications of the ACM* 54.10 (2011): 14. Print.

Anthony, Sebastian. "Harvard Cracks DNA Storage, crams 700 terabytes of Data into a single gram." *ExtremeTech*. 17 August 2012. Web. 18 August 2012.

Antonelli, Paola. "Design and the Elastic Mind." *Design and the Elastic Mind*. Ed. Antonelli, Paola. New York: Museum of Modern Art & Distributed Art Publishers, 2008. 14–27. Print.

—. "Of Good Clothes and Good Design." *Yeohlee: Work*. Ed. John S. Major and Yeohlee Teng. Mulgrave: Images Publishing Group, (2003): 31-72. Print.

Apple Computer, Inc. "*100 million iPods sold.*" 9 April 2007. Web. 7 August 2007.

—. "Apple Introduces New iPod touch and iPod nano" 12 September 2012. Web. 3 October 2012.—. "Apple Introduces the U2 iPod." 26 October 2004. Web. 29 June 2010.

—. *Calamari*. *YouTube*. Web. 19 September 2012.

—. "H2O Audio Interval Waterproof Headphone System for iPod Shuffle (3rd gen.)." *Apple Store*. Web. 15 January 2010.

—. "iLife '06." *Apple Canada*. Web. 30 January 2007.

—. *Never been an iPod*. *YouTube*. Web. 9 September 2008.

Associated Press. "Japan Optical Camouflage." 2 May 2003. Photo.

Arnheim, Rudolf. *The Power of the Center: A Study of Composition in the Visual Arts*. Berkeley: U of California Press, 1988. Print.

Art Threat. "Art Threat: Exploring the World of Art and Politics." 2008. Web. 22 August 2008.

Ayres, Chris. "From Joystick to Helmet: The Next Leap Forward is All in the Mind." *The Times* 18 July 2008: 20. Print.

Azuma, Ronald. "A Survey of Augmented Reality." *Presence* 6.4 (1997): 355–85. Print.

Azuma, R., et al. "Recent Advances in Augmented Reality." *Computers & Graphics* 21. 6 (2001): 1–15. Web. 25 July 2010.

Bale, Karen. "Mind Games for Skulled Players." *Daily Record* 10 March 2007: 36. Print.

Barron, Cheryl. "Digital Diary." *San Francisco Chronicle* 28 January 2007: E1. Web. 7 March 2007.

Bass, Thomas A. "Dress Code." *Wired Magazine* 6.4 (1998): 1–10. Print.

Basu, Saikat. "The First Invisibility Cloak Could be Practical in Six Months." *Digital Journal*. 4 April 2009. Web. 8 September 2012.

Barthes, Roland. *Image, Music, Text*. Trans. Stephen Heath. New York: Hill & Wang, 1978.

—. *Mythologies*. Trans. Annette Lavers. New York: Hill & Wang, 1972.

Bell, Gordon, and Jim Gemmell. "A Digital Life." *Scientific American* 296.3 (2007): 58–65. Print.

—. "About the Book." Total Recall *Book Website*. Web. 14 July 2009.

—. *Total Recall: How the E-Memory Revolution Will Change Everything*. New York: Dutton, 2009. Print.

—. *Your Life Uploaded*. New York: Plume, 2010. Print.

Bendle, Marvin F. "Teleportation, Cyborgs and the Posthuman Ideology." *Social Semiotics* 12.1 (2002): 45–62. Print.

Benedictus, Leo. "How I Remember: The LifeLogger." *The Guardian* 14 January 2012. Web. 13 April 2012.

Berkeley Lab. "Blurring Lines between Magic and Science: Berkeley Researchers Create an Invisibility Cloak." U.S. Department of Energy. 1 May 2009. Web. 8 September 2012.

—. "Testing Relativity, Black Holes, Strange Attractors in Laboratory." U.S. Department of Energy. 20 July 2009. Web. 8 September 2012.

Berzowska, Joanna. "Electronic Textiles: Wearable Computers, Reactive Fashion, and Soft Computation." *Textile* 3.1 (2005): 2–19. Print.

Berman, Jessica. "'Electronic' Skin Monitors Heart, Brain Function." *VOA News*. 15 August 2011. Web. 15 March 2012.

Bilal, Wafaa. *Domestic Tension*. Art installation. 2007. Web. 19 September 2012.

—. *3rdi*. Art installation. 2010. Web. 19 September 2012.

Bilton, Nick. "G.M. Tinkers with Augmented Reality System for Cars" *Bits New York Times Blog* 17 March 2010. Web. 22 September 2012.

Bittiner, Julian. "Exhibition Review: Design and the Elastic Mind, the Museum of Modern Art, New York, 24 February to 12 May 2008." *Visual Communication* 7.4 (2008): 503–08. Print.

BlackBerry. "BlackBerry® Loves U2." TV and web advertisement. *BlackBerry.com*. 5 July 2010.

Blakesley, David. *The Terministic Screen: Rhetorical Perspectives on Film*. Carbondale: Southern Illinois UP, 2007.

BlogTO (Toronto). *Flickr*. 2008. Web. 22 August 2008.

Bolter, Jay David, and Richard Grusin. *Remediation: Understanding New Media*. Cambridge: MIT P, 1999. Print.

Borgundvaag, Bjug, Howard Ovens, Brian Goldman, Michael Schull, Tim Rutledge, Kathy Boutis, Sharon Walmsley, Allison McGeer, Anita Rachlis, and Carolyn Farquarson. "SARS outbreak in the Greater Toronto Area: the emergency department experience." *Canadian Medical Association Journal* 171.11 (2004): 1342–344. Print.

Bourdieu, Pierre. *Language and Symbolic Power*. Cambridge, MA: Harvard UP, 1991. Print.

Boyle, Rebecca. "Epidermal Electronics' Paste Peelable Circuitry On Your Skin, Just Like A Temporary Tattoo." *Popular Science* 12 August 2011. Web. 21 March 2012.

Bridges, Andrew. "Scientists Aim to Duplicate Harry Potter's Invisibility Cloak." *Live Science*. 25 May 2006. Web. 13 July 2009.

—. "Scientists Ponder Invisibility Cloak." *Associated Press Online*. Web. May 26 2006.

Brinkley, Leslie. "For sale? Spot in line for coveted iPhone." *ABC News*. 28 June 2007. Web. 29 May 2008.

Buckler, Ernest. *Ox Bells and Fireflies*. Toronto: McClelland and Stewart, 1968. Print.

buddesign. *Nokia Morph Concept (long)*. *YouTube*. 25 February 2008. Web. 7 July 2010.

Burke, Kenneth. *A Grammar of Motives*. Berkeley: U of California P, 1945. Print.

—. *A Rhetoric of Motives*. 2nd edition. Berkeley: U of California P, 1969. Print.

—. *Language as Symbolic Action: Essays on Life, Literature, and Method*. Los Angeles: U of California P, 1966. Print.

—. "Poem." *The Legacy of Kenneth Burke*. Ed. Herbert W. Simons and Trevor Melia. Madison: U of Wisconsin P, 1989. Print.

Burnett, Ron. *How Images Think*. Cambridge: MIT P, 2005. Print.

Bygrave, Stephen. *Kenneth Burke: Rhetoric and Ideology*. London: Routledge, 1993. Print.

Carducci, Vince. "Culture Jamming: A Sociological Perspective." *Journal of Consumer Culture* 6.1 (2006): 116–38.

Caron, Andre H., and Letizia Caronia. *Moving Cultures: Mobile Communication in Everyday Life*. Montréal: McGill-Queen's University Press, 2007.

Chengappa, Aditi. "From invisibility cloaks to magic carpets." *Digital Journal*. 2 May 2009. Web. 27 July 2010.

Chu, Ronald Jin. "Smartphone App Measures User's Brainwaves." *Japan Trends*. 13 July 2011. Web. 11 April 2012.

Cogdell, Christina. "Design and the Elastic Mind, Museum of Modern Art (Spring 2008)." *Design Issues* 25.3 (2009): 92–101. Print.

Communications of the ACM. *ACM.org*. 2005 Web. 7 May 2007.

Cordery, Walter. "iPhones won't be here until '08." *Harbour City Star* 30 June 2007: A4. Print.

Coupland, Douglas. *Extraordinary Canadians Marshal McLuhan*. Toronto: Penguin, 2010. Print.

Coxworth, Ben. "Film-maker's Eye is Up and Shooting" *Gixmag.com* 29 August 2011. Web. 22 September 2012.

CNN. "iPhone sales said to hit half-million." *CNNMoney.com*. 2 July 2007. Web. 29 May 2008.

Crawford, Diane. "Editorial Pointers." *Communications of the ACM* 49.1 (2006): 5–7. Print.

Cronian Labs. "Skin Scan—Your Pocket Scan Technology for Skin Cancer Prevention." 11 April 2012. Web. 7 September 2012.

Cross, Alan. "Secret Boston Gig and Interview with U2 Bono." *Explore Music* 13 Mar 2009. Web. 15 June 2010.

Crusius, Timothy. *Kenneth Burke and the Conversation After Philosophy*. Carbondale: Southern Illinois UP, 1999. Print.

Cyberman. Dir. Peter Lynch. Canadian Broadcasting Corporation (CBC), 2001. Film.

Czerwinski, Mary, et al. "Digital Memories in an Era of Ubiquitous Computing and Abundant Storage." *Communications of the ACM* 49.1 (2006): 45–50. Print.

Danigelis, Alyssa. "Electronic Tattoo Grafts Gadgets to Skin." *Discovery News* 11 August 2011. Web. 20 September 2012.

DARPA. "DARPA Mission." DARPA About. *Defense Advanced Research Projects Agency (DARPA)*. Web. 19 April 2012.

—. "DARPA Mission." DARPA Home. *Defense Advanced Research Projects Agency (DARPA)*. Web. 9 October 2003.

—. "Lifelog Mission." *Defense Advanced Research Projects Agency (DARPA)*. 2003. Web. 26 June 2003.

—. "PIP for Lifelog (Baa# 03–30)." *Defense Advanced Research Projects Agency (DARPA)*. 7 May 2003. Web. 26 June 2003.

Davis, Joanna. "Invisibility Cloak Closer to Reality." *The Press* 1 June 2006: 3. Print.

de Grey, Aubrey. "Why We Age and How We Can Avoid It" *TED Talks* July 2005. Web.
 3 October 2012.

della Cava, Marco R. "Let Video Games Read Your Mind." *USA Today* 5 August 2008: D3. Print.

Design and the Elastic Mind. Online exhibition, *The Museum of Modern Art*. Spring 2008. Web. 7 July 2010.

Didymus, JohnThomas. "Texas scientists create 'invisibility cloak' for 3-D objects." *Digital Journal* 26 January 2012. Web. 24 April 2012.

Dillow, Clay. "Amid Privacy fears, police across the nation will role out face-recognizing iPhone tech this year." *PopSci* 14 July 2011. Web. 11 April 2012.

Dixon, Sara. "Magic cloak makes GBP 100,000 vanish." *Express* 21 August 2009: 15. Print.

Drummond, Katie. "Invisibility's Next Frontier: Scientists Cloak 3D Objects." *Wired Magazine* 25 January 2012. Web. 24 April 2012.

du Gay, Paul, Stuart Hall, Linda Janes, Hugh Mackay, and Keith Negus. *Doing Cultural Studies: The Story of the Sony Walkman*. London: Sage Publications, 1997.

Elliot, Stuart. "Academy Awards ads routed Super Bowl's." *International Herald Tribune* 27 February 2007. Web. 31 July 2008.

dreamyear. "Time Machine Patent !!!!" 1 June 2008. Web. 8 September 2012.

Elmer-DeWitt, Philip. "30,000 Canadians Petition for iPhone Rate Relief." *CNNMoney* 29 June 2008. Web. 3 October 2012.

Elmer, Greg, and Andy Opel. *Preempting Dissent: The Politics of an Inevitable Future*. Winnipeg: Arbeiter Ring Publishing, 2008. Print.

Emotiv. *Emotiv.com* Web. 18 October 2010.

Emotiv Systems. "Emotiv Unveils World's First Brain-Controlled Video Gaming Headset." *Business Wire* 20 February 2008. Web. 7 June 2010.

Ermolov, V., et al. "Significance of Nanotechnology for Future Wireless Devices and Communications." *18th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC'07), 3–7 September 2007.* Los Alamitos, CA: IEEE Publishing, 2007. 1–5. Print.

Fahnestock, Jeanne. "Accommodating Science: The Rhetorical Life of Scientific Facts." *Written Communication* 3.3 (1986): 275–96. Print.

The Final Cut. Dir. Omar Naim. Lions Gate Home Entertainment, 2004. Film.

Fluid Interfaces Group. "Our Vision." *MIT Media Lab*. 2010. Web. 14 June 2010.

Frazier, Mya. "When a Brand Buster Becomes a Brand." *Advertising Age* *78*.47 (2007): 1–29. Print.

Freedman, David. "Future Tech: Looking Forward to the Post-Screen Era." *Discover Magazine* March 2011. Web. 15 March 2012.

Freedman, D.H. "Reality Bites." *Inc.* 1 December 2008. Web. 12 May 2009.

Fukuyama, Francis. "Transhumanism." *Foreign Policy* 144 (September-October 2004): 42-43. Print.

Gage, Douglas. "Lifelog Objective." *Defense Advanced Research Projects Agency (DARPA)*. Web. 31 July 2003.

Gallagher, James. "Electronic tattoo 'could revolutionise patient monitoring.'" *BBC News* 12 August 2011. Web. 15 March 2012.

Ganapati, Priya. "Eye Spy: Filmmaker Plans to Install Camera in His Eye Socket." *Wired Blog: GadgetLab* 4 December 2008. Web. 8 July 2009.

Gartner Inc. "Gartner Says Sales of Mobile Devices Grew 5.6 Percent in Third Quarter of 2011; Smartphone Sales Increased 42 Percent." *Gartner Newsroom* 15 November 2011. Web. 23 March 2012.

Gemmell, Jim, Gordon Bell, and Roger Lueder. "MyLifeBits: Personal Database for Everything." *Communications of the ACM* 49.1 (2006): 89–95. Print.

Gershenfeld, Neil. *When Things Start to Think*. New York: Henry Holt, 1999.

Goldman, Robert, and Stephen Papson. *Nike Culture: The Sign of the Swoosh*. London: Sage, 1998. Print.

Google. "Project Glass." 29 June 2012. Web. 26 July 2012.

—. "Project Glass: One Day…" *YouTube.* 4 April 2012. Web. 22 September 2012.

Gow, Gordon A., and Richard K. Smith. *Mobile and Wireless Communications: An Introduction*. New York: Open UP, 2006. Print.

Grammenos, Dimitris. "The Ambient Mirror: Creating a Digital Self-Image through Pervasive Technologies." *interactions* 16.2 (2009): 46–50. Print.

Gray, Fiona. "Invisibility Cloak You'll Never See." *Scotland on Sunday* 23 November 2008: 10. Print.

Gronnvoll, Marita, and Jamie Landau. "From Viruses to Russian Roulette to Dance: A Rhetorical Critique and Creation of Genetic Metaphors." *Rhetoric Society Quarterly* 40.1 (2010): 46–70. Print.

Grossman, Lisa. "Illusion Device Could Make One Object Look Like Another; A Modified Invisibility Cloak Could Make Military Planes Look Like Civilian Ones, Says Scientists." *New Scientist* 4 July 2009: 20. Print.

Grusin, Richard. "Premediation." *Criticism* 46.1 (2004): 17–39. Print.

—. "Premediation and the Mediaphilia of Anticipation." Rogers Communication Centre, Ryerson University, Toronto. 29 January 2009. Lecture.

Gusfield, Joseph R. "Introduction." *On Symbols and Society*. Ed. Joseph R. Gusfield. Chicago: U of Chicago P, 1989. 1–52. Print.

Hallen, James. *Open Letter to Steve Jobs about the situation*. 15 August 2008. Web. 20 September 2012.

Hansen, Mark B. N. *Bodies in Code: Interfaces with Digital Media*. New York: Routledge, 2006. Print.

Harmon, Katherine. "Skinlike Electronic Patch Takes Pulse, Promises New Human-Machine Integration." *Scientific American* 11 August 2011. Web. 20 September 2012.

Hartman, Kate. "The Art of Wearable Communication." *TED*. March 2011. Web. 7 May 2012.

Hawk, Byron. *A Counter-History of Composition: Toward Methodologies of Complexity*. Pittsburg, PA: U of Pittsburgh P, 2007. Print.

Hawk, Byron, David M. Rieder, and Ollie Oviedo. *Small Tech: The Culture of Digital Tools*. Minneapolis: U of Minnesota P, 2008. Print.

Hayles, N. Katherine. "Commentary: The Search for the Human." *New Literary History* 36.2 (2005): 327–33. Print.

—. "Connecting the Quantum Dots: Nanotechscience and Culture." *Nanoculture: Implications of the New Technoscience*. Portland: Intellect Books, 2004. 11–26. Print.

—. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics.* Chicago: U of Chicago P, 1999. Print.

—. "Wrestling with Transhumanism: Is Finitude a Necessary Human Condition?" Transhumanism and the Meanings of Progress workshop, ASU, Tempe, AZ, April 24–25, 2008. Web. 22 September 2012.

—. *How We Think: Digital Media and Contemporary Technogenesis*. Chicago: U of Chicago P, 2012. Print.

—. *Writing Machines*. Cambridge: MIT P, 2002. Print.

Heap, Imogen. "Want to accompany me on the red carpet today?" 31 January 2010. Web. 1 February 2010.

The Heavy Projects. "G George." Los Angeles: Lab Art. June 2011. Art installation.

Hecht, Jeff. "Magic carpets can hide objects in plain sight." *New Scientist* 13 June 2009: 20. Print.

Hinchey, Xanthe. "Harvesting energy: body heat to warm buildings." *BBC News* 11 January 2011. Web. 21 March 2012.

Hirst, Nicholas. "No Apple iPhone? You must be Canadian." *Winnipeg Free Press* 2 August 2007: A11. Print.

Holmes, Sam. "Introducing the Next Joy Stick—Your Mind." *The Advertiser* 13 March 2007: 19. Print.

Hurst, Lynda. "Keep Your Eyes On the Submarine; It Was a Banner Year for Research in Invisibility. The U.S. Army Could Have a Device Within a Decade." *Toronto Star* 25 October 2008: ID03. Print.

Hurtado, Joseph. *Toronto—iPod City. Flickr*. 9 September 2008. Web. 20 September 2012.

Hutcheon, Linda. "Postmodern Afterthoughts." *Wascana Review of Contemporary Poetry and Fiction 37*(1) (2002): 5–12. Print.

Hsu, Jeremy. "Intel Wants Brain Implants in Its Customers' Heads by 2020." *Popular Science* 20 November 2009. Web. 20 September 2012.

Inami, Masahiko, Naoki Kawakami, and Susumu Tachi. "Optical Camou-flage Using Retro-Reflective Projection Technology." *Proceedings of the Second IEEE and ACM International Symposium on Mixed and Augmented Reality (ISMAR '03), 7–10 October, 2003*. Los Alamitos, CA: IEEE Publishing, 2003. 348–49. Print.

"Introducing New Scientist." *New Scientist*. Web. 8 September 2012.

"Invisibility Cloaks: Items of the Future?" *Irish News* 12 August 2008: 22. Print.

"Invisible Man Close to Reality." *Daily Telegraph* 22 August 2009: 4. Print.

iphonenoflash. *iPhone Parody No Flash. YouTube*. 2007. Web. 22 August 2008.

Jones, Dylan. *iPod, Therefore I Am: Thinking Inside the White Box*. New York: Bloomsbury, 2005. Print.

Jack, Jordynn. "What are Neurorhetorics?" *Rhetoric Society Quarterly* 40.5 (2010): 405–10. Print.

Jack, Jordynn, and L. Gregory Appelbaum. "This is Your Brain on Rhetoric: Research Directions for NeuroRhetorics." *Rhetoric Society Quarterly* 40.5 (2010): 411–37. Print.

Jenkins, Henry. *Convergence Culture: Where Old and New Media Collide*. New York: New York UP, 2006. Print.

—. *Fans, Bloggers, and Gamers: Media Consumers in a Digital Age*. New York: New York UP, 2006. Print.

—. *Textual Poachers: Television Fans and Participatory Culture*. New York: Routledge, 1992. Print.

Kahney, Leander. *The Cult of iPod*. San Francisco, CA: No Starch Press, 2005. Print.

Kelly, Cathal. "Newest Computer Touch Screen May be Your Own Body." *Toronto Star* 6 March 2010. Web. 4 May 2010.

Kenyon, Matthew, and Doug Easterly. *Improvised Empathetic Device (I.E.D.) S.W.A.M.P. YouTube*. 28 April 2011. Web. 20 September 2012.

Kittler, Friedrich. *Gramophone, Film, Typewriter*. Trans. Geoffrey Winthrop-Young and Michael Wutz. Palo Alto, CA: Stanford UP, 1999. Print.

Kress, Gunther R., and Leo van Leeuwen. *Reading Images: The Grammar of Visual Design*. 2nd ed. New York: Routledge, 2006. Print.

Lanier, Jaron. *You Are Not A Gadget: A Manifesto*. New York: Vintage, 2011. Print.

Lasn, Kalle. *Culture Jam: How to Reverse America's Suicidal Consumer Binge—and Why We Must*. New York: Harper, 2000. Print.

Le, Tan, and ForaTV. "Mind Control Device Demonstration—Tan Le." *YouTube*. 31 December 2008. Web. 8 July 2010.

Lee, Ellen. "The iLine begins." *SFGate.com* 27 June 2007. Web. 29 May 2008.

Lehman, Stan. "Locator chips keep track of students in Brazil." *The Guardian* 22 March 2012. Web. 12 September 2012.

Leo Burnett Moscow. *Death Revealer.* Computer software. *Apple App Store.* 11 August 2011.

Lepht Anonym. "About Me" *Sapiens Anonym.* 7 May 2011. Web. 6 June 2011.

Levinson, Paul. *Digital McLuhan.* London: Routledge, 1999. Print.

Lions Gate Home Entertainment. *The Final Cut:* Movie Trailer #2. *IMDB.com.* 2004. Web. 30 January 2007.

Ma, Zhenqiang. "An Electronic Second Skin." *Science* 12 August 2011: 830–31. Print.

MacManus, Richard. "The Wearable Internet Will Blow Mobile Phones Away." *New York Times* 20 July 2009. Web. 26 July 2010.

Maes, Pattie. "Pattie Maes and Pranav Mistry Demo SixthSense." *TED.* February 2009. Web. 7 January 2010.

Main. Douglas.. "Electronic Sensors That Stick to Your Skin Like Temporary Tattoos." *Popular Mechanics* 12 August 2011. Web. 20 September 2012.

Mann, Steve. "Mediated Reality." *Linux J* 59 (1999): 5. Print.

—. "Telematic Tubs against Terror: Bathing in the Immersive Interactive Media of the Post-Cyborg Age." *Leonardo* 37.5 (2004): 372–73. Print.

Mann, Steve, with Hall Niedzviecki. *Cyborg: Digital Destiny and Human Possibility in the Age of the Wearable Computer.* Toronto: DoubleDay, 2001. Print.

Marck, Paul. "Canadians await launch of much-hyped iPhone." *Winnipeg Free Press* 23 June 2007: B9. Print.

—. "July likely arrival date of iPhone in Canada." *Calgary Herald* 23 June 2007: C9.

—."iPhone puts Canada on hold." *Edmonton Journal* 22 June 2007: E1. Print.

—. "Sellers expect the iPhone to hit Canada this summer." *The Vancouver Sun* 23 June 2007: F4. Print.

McCarthy, Lauren. "Tools for Social Interacting." *Leonardo* 43.4 (2010): 400–01. Print.

McCarthy, Will. "Being Invisible." *Wired Magazine* 11.8 (2003). Web. 20 September 2012.

McKenna, Barrie. "Will iPhone change everything—or fall flat?" *The Globe and Mail* 26 June 2007: B18. Print.

McLuhan, Marshall. "The Hot and Cold Interview with Gerald Emanuel Stearn." In McLuhan: *Hot and Cool: A Critical Symposium*, Ed. Gerald Stearn. New York: Dial 1967.

—. *Media Research: Technology, Art, Communications (Critical Voices).* Ed. Michel Moos. Amsterdam: G+B Arts International, 1997. 45–78. Print.

Melzer, James E., and Kirk Moffitt. *Head Mounted Displays: Designing for the User.* Ed. Robert E. Fischer and Warren J. Smith. New York: McGraw Hill, 1997. Print.

MicroVision. "Company History." 2009. Web. 5 July 2010.

—. "Wearable Displays: Military Displays." 2009. Web. 5 July 2010.

—. "Wearable Displays: Mobile Device Eyewear." 2009. Web. 5 July 2010.

Milburn, Colin. *Nanovision: Engineering the Future.* Durham, NC: Duke UP, 2008.

—. "Nanotechnology in the Age of Posthuman Engineering: Science Fiction as Science." *Nanoculture: Implications of the New Technoscience.* Ed. N. Katherine Hayles. Portland, OR: Intellect Books, 2004. 109–29. Print.

—. "Nanotechnology in the Age of Posthuman Engineering: Science Fiction as Science." *Configurations* 10.2 (2002): 261–95. Print.

Miller, Carolyn R. "Opportunity, Opportunism, and Progress: *Kairos* in the Rhetoric of Technology." *Argumentation* 8 (1994): 81–96. Print.

"MindFlex Game." *Amazon.com.* Web. 11 June 2010.

"Mind Games." *The Economist* 17 March 2007 vol 382:8520.ST. 4. Print.

Minnery, B. S., and M.S. Fine, M. S. "Neuroscience and the future of human-computer interaction." *interactions* 16.2 (2009): 70–75. Print.

Minority Report. Dir. Steven Spielberg. Twentieth Century-Fox Film Corporation, 2002. Film.

Mistry, P., Pattie Maes, and L. Chang. "WUW—Wear Ur World: A Wearable Gestural Interface." *Proceedings and Extended Abstracts of the 27th Annual CHI Conference on Human Factors in Computing Systems: Digital Life, New World*, *April 4–9, 2009: Spotlight on Work in Progress Session 1, New York.* Assoc. for Computing Machinery, 2009. 4111–116. Print.

Morales, Alex. "Harry Potter's Invisibility Cloak is Conceivable, Scientists Say." *Deseret Morning News* 28 May 2006 Web. 3 October 2012.

Mosco, Vincent. *Digital Sublime: Myth, Power, and Cyberspace.* Cambridge: MIT P, 2004. Print.

Musgrove, Mike. "Apple Seeks To Muscle Into Telecom With iPod Phone." *The Washington Post* 10 January 2007: D1. Print.

MyLifeBits Project. Microsoft BARC Media Presence Group. 2010. Web. 12 July 2010.

Narumi, Takuji, et al. "Meta cookie." *International Conference and Exhibition on Computer Graphics and Interactive Technologies (SIGGRAPH), Los Angeles, July 25–29, 2010.* Exhibit.

Nijholt, Anton, Boris Reuderink, and Danny Oude Bos. "Turning Shortcomings into Challenges: Brain-Compuer Interfaces for Games." *Intelligent Technologies for Interactive Entertainment: Third International Conference, INTETAIN 2009, Amsterdam, The Netherlands, June 22–24, 2009.* Berlin: Springer, 2009. 153–68. Print.

"No iPhones for Canadians." *Times & Transcript* (Moncton, NB) 30 June 2007: D2. Print.

"Nokia Morph concept" *www.nokia.com.* Web. 7 July 2010.

"Now We See Myth of Invisibility Come True." *Courier Mail* 12 August 2008: 17. Print.

NEC Corporation. *NEC Offers World's First Ubiquitous Business Support System Using Retinal Imaging Displays and Wearable Computers.* 26 October 2009. Web. 12 January 2010.

Nokia Research Center. *Nokia Mixed Reality—Nokia Worlds. YouTube.* 30 October 2009. Web. 26 July 2010.

O'Brien, Terrence. "Eyeborg filmmaker fires up eye-cam to document cutting edge prosthetics (video)." *Engadget.com*. 28 august 2011. Web. 17 October 2012.

O'Gorman, Marcel. *Necromedia*. 2005. Web. 13 July 2009.

Orr, J. S. "Engage Cloaking Device; Scientists in Hot Pursuit of the Ultimate Vanishing Act." *Post-Standard* 28 May 2007: A10. Print.

Ovid. *Metamorphoses*. Trans. Michael Simpson. Baltimore: U of Maryland P, 2001. Print.

Palmer, Jason. "'Cloaking' A 3-D Objects from all angles demonstrated." *BBC News* 25 January 2012. Web. 24 April 2012.

Paul, Ian. "Apple's iPhone 4 Hired as Tricorder for Space Station." *PCWorld* 13 June 2011. Web. 14 March 2012.

Parry, Marc. "Health Problems Force Professor to Pull Camera From Back of Head." *The Chronicle of Higher Education* 7 February 2011. Web. 9 September 2012.

Parviz, Babak A. "Augmented Reality in a Contact Lens." *IEEE Spectrum* September 2009. Web. 14 January 2010.

Pedersen, Isabel. "A Semiotics of Human Actions for Wearable Augmented Reality Interfaces." *Semiotica* 155.1/4 (2005): 183–200. Print.

—. "Dehumanization, Rhetoric, and the Design of Wearable Augmented Reality Interfaces." *Small Tech: The Culture of Digital Tools*. Ed. Byron Hawk, David Rieder, and Ollie Oviedo. Minneapolis: U of Minnesota P, 2008. Print.

—. "Mobility, Human-centricity, and the Design of Wearable Augmented Reality Interfaces." *International Journal of the Humanities* 3.1 (2006): 143–54. Print.

—. "MyLifeBits, augmented memory, and a rhetoric of need." *Continuum: Journal of Media and Cultural Studies* 22.3 (2008): 375–84. Print.

Pentland, Alex. *Honest Signals: How They Shape Our World*. Cambridge: MIT P, 2008. Print.

Pfanner, Eric. "Cameron Exploring Crackdown on Social Media After Riots." *The New York Times* 11 August 2011. Web. 14 March 2012.

Pilieci, Vito. "Apple's iPhone launch leaves Canadians i-envious." *The Van-couver Sun* 28 June 2007: F5. Print.

—. "Canada's iWait will continue." *Ottawa Citizen* 28 June 2007: D1. Print.

—. "Canadians left out of rush for iPhone." *Calgary Herald* 30 June 2007: D7. Print.

Plato. *The Republic of Plato: Second Edition*. Ed. Alan Bloom. New York: Basic Books, 1991. Print.

Pruchnic, Jeff. "Neurorhetorics: Cybernetics, Psychotropics, and the Materiality of Persuasion." *Configurations* 16.2 (2008): 167–97. Print.

Qualcomm Tricorder X Prize. "X PRIZE Foundation and Qualcomm Foundation Set to Revolutionize Healthcare with Launch of $10 Million Qualcomm Tricorder X PRIZE." *www.qualcommtricorderxprize.org*. 10 January 2012. Web. 14 March 2012.

Quinn, Michelle. "While Canadians wait for iPhone, Americans try to break the code." *The Gazette* 14 July 2007: I2. Print.

Rainwater, D., A. Kerkhoff, K. Melin, J.C. Soric, J. Moreno, and A. Alu. "Experimental verification of three-dimensional plasmonic cloaking in free-space" *New Journal of Physics* 14 (2012) 13pp. Print.

Rankin, Mike. "St Andrews Physicist 'Turning Science Fiction into Reality.'" *Fife Today*. 27 August 2009. Web. 20 September 2012.

Rawsthorn, Alice. "The Demise of 'Form Follows Function'; the Way Digital Products Look Often Bears No Relation to What They Do." *International Herald Tribune* 1 June 2009: 14. Print.

Redshaw, Kerry. "Claude Shannon (1916–2001)." 1996. Web. 2 July 2009.

Reed, Fred. "Thought Police May Be Coming" *Washington Times* 14 April 2007: C08. Print.

Regan, Tom, and Jim Bencivenga. "Post Digital Big Brother." *The Christian Science Monitor* 2 June 2003. Web. 31 July 2003.

Reuters. "Cloaking Device Begins to See Light of Day. "*Pittsburgh Tribune Review* 11 August 2008. Web. 20 September 2012.

Reynolds, James. "Scientific Wizards Find Real Cloak of Invisibility." *The Scotsman* 1 March 2005: 20. Print.

Rheingold, Howard. *Smart Mobs: The Next Social Revolution*. New York: Basic Books, 2002. Print.

Rhodes, Bradley. "A Brief History of Wearable Computing." *MIT*. 10 September 2003. Web. 20 September 2012.

Rocha, Roberto. "In Canada, iPhone is still a paperweight." *The Gazette* 11 August 2007: C2. Print.

Ryan, Susan Elizabeth. "Re-Visioning the Interface: Technological Fashion as Critical Media." *Leonardo* 42.4 (2009): 307–13.

Saltzman, Marc. "Why the iPhone is on hold in Canada." *The Gazette* 23 June 2007: I1. Print.

Sample, Ian. "The Brain Scan That Can Read People's Intentions" *Guardian News and Media* 9 February 2007. Web. 20 January 2009.

Saramago, José de Sousa. *Blindness*. London: Harvill P, 1997. Print.

Sargent, Ted. *The Dance of Molecules: How Nanotechnology Is Changing Our Lives*. Toronto: Viking Canada, 2005. Print.

Schiele, Bernt, Thad Starner, Brad Rhodes, Brian Clarkson, and Alex Pentland. "Situation Aware Computing with Wearable Computers." *Fundamentals of Wearable Computers and Augmented Reality*. Ed. Woodrow Barfield and Thomas Caudell. New Jersey: Lawrence Erlbaum Associates, 2001. 511–37.

Scheeres, Julia. "Saving Your Bits for Posterity." *Wired News* 6 Dec ember 2002. Web. 30 May 2007.

Schwerdtfeger, Björn, and Gudrun Klinker. "Supporting Order Picking with Augmented Reality." *Proceedings of the 7ᵗʰ IEEE/ACM International Symposium on Mixed and Augmented Reality, September 15–18, 2008, Cambridge (UK)*. Los Alamitos, CA: IEEE Publishing, 2008. 91–94. Print.

Seigneur, Jean-Marc. "The Emotional Economy for the Augmented Human." *Augmented Human International Conference, March 12–14, 2011, Tokyo*.

Seigel, Marika A. "'One Little Fellow Named Ecology': Ecological Rhetoric in Kenneth Burke's *Attitudes Toward History*." *Rhetoric Review* 23.4 (2004): 388–403. Print.

Sloane, Neil. "Biography of Claude Elwood Shannon." *AT&T Shannon Lab*. 2003. Web. 2 July 2009.

Shachtman, Noah. "Pentagon Kills LifeLog Project." *Wired.com*. *2* April 2004. Web. 8 July 2009.

Shanahan, Leo. "The Latest Computer Plug-in: Your Brain." *The Age* 25 April 2006: 3. Print.

Sinnreich, Aram. "Come Together, Right Now: We Know Something's Happening, But We Don't Know What It Is." *International Journal of Communication* 1 (2007): 44–47. Print.

Soar, Michael. "The First Things First Manifesto and the Politics of Culture Jamming: Towards a Cultural Economy of Graphic Designs and Advertising." *Cultural Studies* 16.4 (2002): 570–92.

some_guy_said. "Post a Comment." *ExtremeTech* 17 August 2012. Web. 18 August 2012.

Sorensen, Chris. "Apple sets out to sell iPhone by its rules." *The Toronto Star* 28 June 2007: B1. Print.

Spence, Rob. "About Me" *Eyeborg.blogspot* 29 January 2009. Web. 17 October 2012.

—. *Deus Ex: The Eyeborg Documentary. Eyeborg Blog*. 2011. Web. 20 August 2012.

—. "Team Eyeborg Goes on the Daily Planet." 2009. Web. 8 July 2009.

—. "The Daily Planet: One Eyed Toronto Film Maker Turns Bionic with a Web Cam Eye." 9 April 2009. Web. 8 July 2009.

—. "The Eyeborg Project." 2009. Web. 8 July 2009.

St. Clair, John Quincy. "Full Body Teleportation System." U.S. Patent Application Number: 10/953,212. Filled 29 September 2004.

Stallabrass, Julian. *Gargantua: Manufactured Mass Culture*. London: Verso, 1996. Print.

Starner, Thad, Steven Mann, Bradley Rhodes, Jeffrey Levine, Jennifer Healey, Dana Kirsch, Rosalind W. Picard, and Alex Pentland. "Augmented Reality through Wearable Computing." *Presence* 6.4 (1997): 386–98. Print.

Sterling, Bruce. "Interview with Bruce Sterling: Augmented Reality and Transitioning out of the Old-Fashioned 'Legacy Internet.'" *Augmented Reality Event 2011*. 6 May 2011. Web. 23 March 2012.

Stillar, Glenn. *Analyzing Everyday Texts: Discourse, Rhetoric and Social Perspectives*. Thousand Oaks, CA: Sage, 1998. Print.

Strange Days. Dir. Kathryn Bigelow. Twentieth Century Fox Home Entertainment, 1995. Film.

Stross, Randall. "Tracking Vital Signs, Without the Wires." *New York Times* 3 September 2011: BU3. Print.

Stuart, Keith. "Technology: Game Theory: When Games Get Physical, Guilt Comes into Play." *Guardian* 27 August 2009: 3. Print.

SwingDrama. *Lifelogger*. Computer software. *Apple App Store*. 13 December 2011 Web. 13 April 2012.

Tatum, William O., A. Husain, S. Benbadis, and P. Kaplan. *Handbook of EEG Interpretation*. New York: Demos Medical Publishing, 2008. Print.

Thorp, Edward O. *Beat the Dealer: A Winning Strategy for the Game of Twenty-One*. New York: Random House, 1962.

—. "The Invention of the First Wearable Computer." *The Second International Symposium on Wearable Computers, October 19–20, 1998, Pittsburgh, PA*. 4–8. Print.

Tolkien, J.R.R. *The Lord of the Rings*. New York: Ballantine Books, 1973. Print.

Toronto 2007. *Flickr*. Web. 25 August 2008.

"Toronto Rocked." *CBC News*. 30 July 2003. Web. 12 September 2012.

United States Patent and Trademark Office. "What Are Patents, Trademarks, Servicemarks, and Copyrights?" 12 May 2004. Web. 5 July 2010.

Usher, Oliver. "The Memory Machine." *Varsity* 2 March 2006. Web. 30 June 2007.

Virilio, Paul. *The Information Bomb*. Trans. Chris Turner. New York: Verso, 2000. Print.

—. *Ground Zero*. Trans. Chris Turner. New York: Verso, 2003. Print.

—. *Crepuscular Dawn*. Trans. Sylvère Lotringer. Cambridge: MIT P, 2002. Print.

Vuksanovich, Kalan. "Interview with Dr. Steve Mann: InteraXon's very own Research Advisor." 9 August 2011. Web. 5 May 2012.

Weiss, Rick. "Their Deepest, Darkest Discovery: Scientists Create a Black That Erases Virtually All Light." *Washington Post* 20 February 2008. Web. 15 Aug. 2010.

Weiser, Mark. "The Computer for the 21st Century." *Scientific American* September 1991: 94–104. Print.

Wells, H.G. *The Invisible Man*. London: C. Arthur Pearson, 1897.

World Intellectual Property Organization (WIPO). "What Role do Patents Play in Everyday Life?" Web. 5 July 2010.

X PRIZE Foundation. "Who We Are." *www.xprize.org*. 2012. Web. 14 March 2012.

Yong, Ed. "'Electronic skin' could replace bulky electrodes." *Nature News* 12 August 2011. Web. 15 March 2012.

Index

About the Author