

# Having a Sense of Ourselves: Communications Technology and Personal Identity

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## Abstract

As technological advancement accelerates, reactions toward new technologies can elicit resistance and adoption. This paper explores the character of resistance and adoption of technology from the theoretical perspectives of instrumentalism and critical theory. Key to this analysis is the interplay between human senses and technology as it may alter notions of personal identity and of social worldviews. Research in sensory compensation and virtual reality demonstrate both the presumed dominant theory of instrumentalism and the need for a more adequate theoretical grounding, e.g. critical theory of technology. Resistance to technology is examined from the perspective of education. Implications for inter-disciplinary research are discussed.

## 1 Introduction

A critical theory of technology requires a substantial vision of what technology is, what it does and what it could do, as well as a normative perspective that provides a philosophical and ethical ground from which to delineate positive and negative forms and uses. (Kellner, 1999)

Moore's Law, a computer industry rule of thumb, reliably predicts that the speed and power of computer performance will double every 18 months.<sup>1</sup> The shape and form of computers has changed as well. Yesterday's room filling isolated VAX mainframe has been replaced by today's desktop internet-connected PC. Tomorrow, wearable computers equipped with the latest sensory devices that send and receive signals from the global positioning system will replace these PC's in our homes and schools.<sup>2</sup>

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<sup>1</sup> In 1958, the first integrated circuit had two transistors and in 1997 the Pentium II processor had 7.5 million transistors.

<sup>2</sup> MIT's wearable computer website <http://lcs.www.media.mit.edu/projects/wearables/>. The site notes that to date personal computers have not lived up to their name. Wearable computing hopes to shatter this myth of how a computer should be used. A person's computer should be worn, much as eyeglasses or clothing are worn, and interact with the user based on the context of the situation. With heads-up displays, unobtrusive input devices, personal wireless local area networks, and a host of other context sensing and communication tools, the wearable computer can

The rapidity of technological advancement staggers the imagination and catches many people off-guard as they try to absorb the impact of learning new technologies, new tools, new ways of knowing. Reactions toward new technologies can elicit resistance and adoption. This paper explores the character of resistance and adoption of technology from the theoretical perspectives of instrumentalism and critical theory. Key to this analysis is the interplay between human senses and technology as it alters notions of personal identity and of social worldviews. The implications of identity alteration affect both computational modelling researchers and educators. In particular, computational modelling researchers who wish to incorporate socially constructed identity into their models learn that personal identity is not fixed in time or space, and that the use of electronic technology plays a role in such changes. More broadly, for educators the implications are explicitly focused on developing multiple literacies in anticipation of the changing role that human senses play in communications technologies.

## 2 Instrumental and Critical Theory

A heuristic to guide analysis can be developed as follows. Two types of resistance to technology are an outright rejection of new technologies, and a willingness to use new technologies but under the guidance of the old

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act as an intelligent assistant, whether it be through a Remembrance Agent, augmented reality, or intellectual collectives.

instrumentalist framework. Adoption of technology is also a willingness to use new technologies but guided by a critical theory of technology. The dependency on which guiding theoretical framework is referred to in this dialectic is intimately connected to human sensibility. The resistance-adoption dialectic serves a useful heuristic purpose. Certainly there is a continuum along this dialectic and in some circumstances the same person will be more likely to adopt technology than other circumstances.

## 2.1 Instrumental theory and identity

Instrumental views of technology are characterized by essentialism, ahistoricism and social abstraction. (Kellner, 1999) The common sense idea is that technologies are tools available to serve the purposes of users. They do not have evaluative content. This means that the use of tools is: indifferent toward the ends of their use, toward politics and ideology; universally applicable in different societies; and, the universality implies that the same set of standards can be used anywhere. Given the instrumental view of technology, the only rational stance toward technology is an unreserved commitment to its use. (Feenberg, 1991)

Characteristic of an instrumental view of technology are conceptions that human identity is something uniquely fixed, pre-given and rationally independent. Individualized instruction, and isolated independent reading and research can best develop a person's identity and proclivities. External guides, e.g. teachers, are not needed in any deeply dependent way but to pass on techniques and practices of know-how. (Stoll, 1995) The affect of tools on personal identity is not about the tool affecting change within us or changing us fundamentally in regards to our perceptual capability. It is only about developing to one's fullest potential what is fundamentally there and pre-existing.

## 2.2 Critical theory and identity

A critical theory of technology is different from an instrumental view in two important ways. First, a critical theory is historical, contextual, value-laden and concrete. A critical theory of technology recognizes that changes in technology are more than just mechanical improvements to our tools that make our lives more efficient. Technology is deeply embedded in all human interactions, social, work-related, creation of goods and services and culture. Society and technology are in constant flux and, therefore, can never be understood as fixed entities or unique across time and space. Technology is, thus, conceptualized as something socially constructed and imbued with societal biases and interests. Second, a critical theory of technology "follows the dialectical logic of both/and rather than either/or in theoriz-

ing new technologies." (Kellner, 1999) It does not set up a false dichotomy between one-sided technophilic or technophobic approaches. Critical theory works with the ambiguities inherent in technology to critique oppressive uses of technology and draw out positive technological implications for enhancing human existence.

Characteristic of a critical theory of technology is notions of personal identity that are socially constructed. Personal identity is in flux and influenced by major societal forces of a historical period. Many refer to the flux as characteristically post-modern. (Kellner, 1995) A post-modern identity refers to multiple identities which one person can assume under different conditions, and refers to new sites and types of identity formation. The affect of tools on personal identity impacts the sites and types of identity formation possible, and does change us in fundamental ways in regards to our perceptual capability.

## 2.3 Communications technology and identity

The discontinuity between these orientations is more than just a theoretical disagreement between two competing practices. In practical terms, the importance of forming a consistent and coherent theoretical picture of technology, society and personal development cannot be understated. We seek to reconcile our practice and theory in order that we prudently guide our educational practices. If scientific advances outpace an understanding of technology's affect then we will be misdirected in our educational practices, for example, using an instrumental view of technology to guide educational policy. A multi-perspectival inquiry reveals that a critical theory of technology yields a more coherent understanding of technology and society. (Kellner, 1995) My arguments are based on current research on human senses and technology. Consequently, our educational practices must be re-aligned toward multiple literacies as I explain below.

The dominant corporate discourse on technology in education is an instrumentally driven nation-wide commitment to get schools hooked-up i.e. wired and connected, to the information super-highway. The benefits are measured through enhanced learning, empowerment, and increased access to information. Communications technologies are just tools ready at hand to be used at the teacher or students' discretion. Their value is derivative of increased efficiency. (Gates, 1995; Stoll, 1995) Teaching, envisioned thus, can in some cases be reduced to web-page curricular materials that erase the middle-man-teacher.

Arguments that shore up instrumentalism have a disquieting undercurrent. On the one hand, it is the "rugged

individualist” in control of her or his destiny through these tools. On the other hand, communications technology is presented as a redesigned central nervous system connecting everyone in a society to a parasitic relationship with the technology. If such an instrumental vision of the future materializes then this it is no longer just a tool to be used at will, but an essential connection to the living world.

An instrumentalist view reconciles the disjunction between having control of and being controlled by technology calling it a “distortion” in which the individual ultimately wins out. This distortion will go away as we invent more technology that will allow us to control the results we want. Such an unreflective recognition of the impact of technology’s affect on human sensibility leads to an infinite regress in justification calling for more and more advanced technologies. For example, distance education video conferencing often creates a spatial distortion that disorients participants. To overcome the spatial distortion and create a more desirable result will rely on advanced research done in sensory compensation and artificial reality. Sensory compensation and virtual reality research, though, provide contrary evidence to this presumed instrumentalist view of technology.

Marshall McLuhan argues that the effects of electric technologies alter our sensibilities in fundamental ways that affect our notions of identity. He uses the terms “closed” and “open” systems, and “inner sense ratio” to describe the phenomena. External tools, or mechanical tools, have extended practically everything a person can do with her body: weapons extend the reach of the arm, glasses extend the reach of the eye, and money is a way of extending and storing labor. Each of these external tools are closed systems within themselves incapable of “collective awareness”. On the contrary, our internal private senses are open systems that are “endlessly translated into each other in that experience we call consciousness.” (McLuhan, 1995) A ratio of interplay among the private senses, the inner sense ratio, is the response of the body to environmental stimuli. With the speed of electric communications technology, McLuhan argues that we have effectively crossed the border between closed and open systems. Transgressing the border occurs both because of the speed and of the connection to language and consciousness.

One of McLuhan’s concerns is the transition that our senses undergo when incorporating new tools into our everyday life. Communications technologies shift the inner balance differently than, say, using a new and improved hammer. The shift in sensibility has an effect on individual identity. McLuhan argues that a change in the inner sense ratio can have aggregate effects on a society. Aggregate effects are reflected through changes in worldviews, conceptions of problems and in social organization. Following McLuhan’s logic, the process to

understand changes in social structure must start first with understanding the nature of the inner sense ratio, how it changes and what effects obtain on an individual’s sense of identity.

### 3 Cross-talk

Are people talking about the change to our inner sense ratio as a result of new technologies? Taking a multi-perspectival approach to this question, I interrogate sensory science, virtual reality researchers, and a sociologist through their written texts. I find that they do not discuss these topics in a consistent way, nor in a way that presupposes a dialogue or in a way that creates a dialogue.

#### 3.1 Sensory compensation

For decades researchers have dreamed of giving sight to the blind and hearing to the deaf with surgically implanted devices. The blind and deaf themselves, however, have used a different strategy: training another sense to do the job. For example, tactile reading, i.e. Braille, a person can process written information as quickly through the fingertip as someone can by visually reading. Some scientists have followed this lead and devoted their energies not toward fixing the broken “sense” but toward devising electronic devices that help the impaired sense to switch senses more effectively. Lundborg implanted microphones in the nonsensate hand that sent acoustic signals of friction sounds to earphones. Possible identification of different textures was made with acoustics, not sensation or vision. (Lundborg, et al., 1995) Their research demonstrates how malleable the senses can be, how one sense can be substituted to some degree with another.

Other researchers investigate the ability of a sense to transform or retrain itself after being damaged. For example, amputees can feel missing hands grab a cup of coffee, missing feet itch, and missing legs ache. Virtually all amputees experience these “phantom limb” phenomena. In an attempt to explain this, researchers have had to re-evaluate their assumptions about how we engage in the world and learn from experience. That the “phantom limb” phenomena occurs means that the sensory cortex is not hard-wired in but has rewired itself, retrained itself to respond to alternate stimuli. This is referred to as the “remapping theory”. Knecht explains that the cortical pathways for the face, hand and torso neighbor one another. Stimulating other areas, e.g. face or torso, can evoke sensations in the missing limb. His research demonstrates, though, that the perceptual changes go beyond what can be explained by shifts in neighbouring cortical representational zones. (Knecht, et al., 1995) We do not fully understand the open system of our internal senses.

These are two ways in which senses compensate, for one another: replacing one sense with another, and remapping a part of one sense with another part of the same sense. Most of us do not have sense impairments or amputated limbs. So, these events are not common to us and we consider them to be outside of “real” everyday experience. Small groups of people whom most of us would not envy or desire to be in their state. But, is this entirely true that only a small sub-set of people experience sensory compensation? Are there other sets of conditions that allow replacement or remapping to occur? What conditions in the world can simulate the sense replacement and repair?

### 3.2 Virtual reality

Researchers in virtual reality focus attention on sensory compensation, enhancement and repair, and presumably these effects are only on a temporary basis. Virtual reality is not about providing devices for people to get along in the real world. It’s about building imaginary worlds, illusions in cyberspace. Advocates of virtual reality note that to create a believable illusion you only need to provide a few well-chosen cues, “the brain fills in the rest”. Virtual reality is beyond the laws of the real world, including gravity, mutual exclusion, distance, size, time.

Japanese researchers in artificial reality concern themselves with the relation of sensory input and output. Research falls roughly into two categories: which sensory cues yield the most comprehensive reality and how to simulate those sensory cues. For example, researchers find a complex relation between sight and sound such that there is a spatial component to both senses. Playing with the spatial component of each sense allows for the simulation or replacement of the other sense. They can induce the same behavioural response by a complex mix of distance, and auditory and visual signals. (Ifukube, 1990) They can induce a change in the inner sense ratio. Similarly, there is work being done on virtual “phantom senses” by studying different elements of tactile stimulus of vibration and temperature.

McLuhan and the two types of sensory scientists have some common ground. All recognize that the inner sense ratio can be controlled, modified or induced by our technologies. The scientific community doing research on the blending of the senses does not find this idea problematic. As a consequence, there is no cultural commentary or critique of the implications of their work, nor is there any mention of the relation of the sensory control to personal identity. McLuhan, on the other hand, calls for this critique of technology’s impact on personal identity and its relation to aggregate societal effects.

### 3.3 Internet

Sherry Turkel is a sociologist of the Internet and has spent the last ten years conducting sociological and psychological assessments of people engaged in heavy Internet use through MUD’s or Multi-User Dimensions. Her ethnographic studies focus on the relation between computer use and personal identity formation. There are two things to note about her research. One, she finds the MUD environment to liberate personal identity from a fixed and unitary state into one that allows for “multiple personalities” and fluidity in self-conceptions. (Turkle, 1996) For example, one person can create many different personae on several different MUDs or personae of any shape and form they choose. The self-conception is no longer a core unitary identity but is decentered through the use of this technology.

McLuhan and Turkel would agree that communications technology have an affect on identity formation in these immersion environments. Turkel concludes that the fractured self can emerge in virtue of the technology that is communications based which crosses over the border between external technology and internal sensibilities. Her work provides an insight to the relationship between communication technology and personal identity.

### 4 Implications for education

The question can be raised what impact does this have for education? There are at least two implications for education. First, we need to develop a deep, fine-grain analysis of resistance and adoption. A first step would be to rewrite the initial heuristic that I introduced. Now, there would be one type of resistance and two types of adoption. Resistance to technology would be comprised of those willing to use technology but under the guidance of an untenable theoretical framework of instrumentalism. Adoption of technology comes in two forms. I argue that an outright rejection of technology is a precursor form of adoption of technology using critical theory, in so far as it is based on a rejection of instrumentalism. It is initially and formally unenlightened about critical theory, but intuitively right on the mark about what needs to be done. The second form of adoption is a willingness to use new technologies but guided by a critical theory of technology.

Current literature focuses on teacher resistance and lack of training as obstacles to technology adoption in schools. This is a very instrumental diagnosis of the symptoms. It may be shown that high resistance to technology integration is based on a fundamental belief that our understanding of technology is not critical enough, that it is too instrumental and untrustworthy. If high resistance is directly related to holding an instrumental view of technology, then to lower resistance en-

tails eliminating an instrumentalist view of technology. Such results would demand that the perspectives change toward regarding technology as socially constructed and embodying historically specific social biases and values. (Kellner, 1998) If this is the case then the initial heuristic of resistance and adoption should be changed as recommended in the paragraph above.

Second, educators must impart the know-how of communication technologies and media literacies that promote the reconstruction of situated knowledges. Education is the lynch pin that provides the tools for people who want to participate in the public and cultural life of the future. Communications tools are essential to all aspects of social life. Multi-perspectival research corroborates that communications technology affects the inner sense ratio and can effect personal identity. Such changes can have aggregate effects on a society. Education cannot turn a blind eye to the technological and scientific advances that are on us now.

Educational practices about new technologies must not only teach the mechanics of how to use the technology but must relay an understanding of the affective nature of the new tools on human sensibilities. This means in part that new understandings of literacy must be developed to meet the challenges of new technologies. (Kellner, 1998) Information content increasingly comes in non-linear forms, e.g. graphical, pictorial and moving images. New forms of content require that new sites and ways of interpreting information be legitimately incorporated into our educational toolkit. As sound, touch and olfactory capabilities, as well as virtual senses, become standard equipment to our communications technologies so too our theories must be accountable to these changed ways of knowing. Moreover, the science behind these standard features will be compensating one sense for another to create the desired alternate reality. Such sensory compensation is occurring without our being aware of it.

We must know about and become aware of how our tools operate on our bodies, the affective nature of what we strap onto our bodies. Literacy no longer can be confined to the linear, alphabetically coded printed page. Navigation will include an intertextual reading between pages, between images, between sounds, i.e. a hyper-“textual” literacy in all these forms. Because of the increased speed and the more direct affect on different human sensibilities that new technologies are moving toward we must develop educational curricular materials and practices that reflect a greater understanding of our tools. To continue on in an instrumental fashion is irresponsible and overtly resistant to reality.

## 5 Future research

I have noted common research projects within separate disciplines that have bearing on one another, but on which no substantial dialogue has occurred. One reason for this lack of dialogue may be due to the overwhelming instrumental perspective we as a culture hold on the role of technology in society. That is, we generally believe that technology is an inert tool that we have control over. However, electronic communications technologies are fast-paced interactive mediums impinging on our senses with rapidity never experienced before in the history of humankind. The nature of the game has changed.

Sensory stimulation and compensation have direct bearing on our interactions with the world and perceptions of identity. Thus, individual notions of identity can form aggregate societal shifts in worldview. I have reported that no substantial dialogue is taking place that addresses these concerns. I argue that both the lack of dialogue and resistance to technology are due to an inadequate theoretical formulation on the relationship between technology and society. We hurl ourselves headlong into a race with technology as if we were in control because our theory presumes this to be true. The lack of dialogue is evidence for this, i.e. that each discipline can act independently and not have a complex societal effect. The act of resistance is evidence that the theory does not adequately address visceral concerns about technology and personal identity.

Future research can bear out the fine-grained analysis of what has begun here. Future research can begin in a multitude of areas and topics. Some ideas for research in education were mentioned: characterize the nature of resistance, determine skills needed for multiple literacy, and develop curriculum to meet new literacy needs.

Future research to investigate the relationship between our communications tools, and our individual and collective identities can begin both historically and scientifically. Notably, I argue for two criteria across the board. One, that researchers acknowledge their theoretical perspective regarding technology. Two, future research needs to be cross disciplinary in order to create a critical dialogue.

One can review the historical research record in sensory compensation and virtual reality to assess the degree to which an instrumental view guided research and policy formation. The historical record could be recast in light of the contrast between an instrumental and a critical perspective toward technology and society. Observed trends over time may inform future research.

Cross-disciplinary discussion should take place between researchers in sensory compensation, virtual reality and communications. Other researchers would also be interested in this topic, e.g. psychologists. Reframe research questions aligned with a critical theory of technology. In general, make theoretical assumptions clear. In particular, some questions to ask are: To what extent do particular technologies effect personal identity or notions of who we think we are? How will we measure this?

It's likely that computational modelling will play an increased role in policy decisions for complex social problems. This is due to advances in both computational theory in the forms of chaos and complexity theories, and advances in high-speed computers that open up new realms of quantitative exploration. These new theories and computational techniques lend themselves to social science inquiry, the inquiry into relationships, networks and decision processes of humans with identities that undergo change.

First and foremost, what is at stake is how we theorize technology and, second, how to evaluate the costs and benefits of technology for society. Understanding the development of personal identity as both socially constructed and as informed by the electronic tools we use will be important factors for incorporating the social dimension in computational models and future research. Both educators and researchers can play a pivotal role as critical guides about new communications technologies and in how we will come to know ourselves in relation to the tools we use. To the extent that educators and researchers can do this is largely based on their theoretical perspective of technology and society.

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