Talking it Out: An Interview with Mara Mills (New York University)

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Mara Mills is Assistant Professor of Media, Culture, and Communication at New York University, a historian of communication technologies, and an expert on disability theory. In the following interview we discuss three approaches to the history and theorization of communication and disability. Centered around the problem of "talk," Mills discusses the challenges facing current and future researchers attentive to the ways new media technologies develop through and alongside the construction of disability, and how knowledge about human perceptual capacities has structured communication research.

Dylan Mulvin: As you know, this issue of *Seachange* is about talk. "Talk," if it is an active concept in your work, is radically specific to the artifacts of technology that you examine. This is evident, for instance, in how you describe the importance of lip reading in conceptualizing the quantification of sound in communication engineering and the co-constitutive loop between deaf educators and sound engineers.

Elsewhere in the history you chart, telephones, hearing aids, artificial larynxes, and talking books all appear at key intersections. Above all, your research into these artifacts describes a choppy trajectory in which knowledge about certain kinds of bodies is incorporated into the physical communication infrastructure.

You are currently working on a project on so-called "talking books" and optical reading technologies, which traces how the identification and transformation of human senses undergird a number of communication

technologies. I wonder, given your current work and two broad axes of research--from hearing aids to talking books--if you have an operative concept of "talk." Or, if you prefer, what questions do you see your work asking about the problem of talk?

Mara Mills: Talk is the most under-theorized concept in the family that includes communication, speech, and voice. Talk implies familiar or informal speech—even gossip. It's the generic word for conversation, oral or otherwise mediated: to talk can mean to sign, text, e-mail, or Gchat. "We were just talking." Its neglect in media studies follows from the invisibility, or seeming triviality, of the everyday and the routine. The lack of work on talk also registers the difficulty of understanding interaction. Talk, more than its allies, signifies exchange—that is why "talking to oneself" is a noteworthy action. To communicate is to "convey" or "transmit," especially by means of communications technology. Speech is as likely a lecture as a conversation; moreover it refers to physiology or mechanism, the act of producing words. With the comeback of voice in the wake of the orality debates, scholars increasingly attend to embodiment and sonic materiality—qualities such as timbre as opposed to intelligible messages or even phonemes. Figuratively, voice is also individual—a point of view. In my research, I've seen the term "talk" employed, throughout the past 150 years, to make machines seem familiar or personable: talking dolls, "artificial talkers," talkies, Walkie Talkies. Talking books, phones, and calculators have similarly been marketed as personal devices for blind people. Even so, it is often argued that the delegation of human capacities to such devices exaggerates the user's disability.

Crosstalk is the genre of talk most central to the argument of my first book. Colloquially, the term means argument or backtalk. But in the context of telephony, it refers to a conversation in one circuit "leaping" or "leaking" into another—someone else's voice sneaking into your phone call. "Other people's speech," agreeable or not, becomes a crisis in the telephone system. As telephony evolved in the early twentieth century, individual communications were increasingly "canalized" or privately channeled. Talk was turned into a series of one-way messages, transmitted from a "sender" to an intended "receiver."

Crosstalk illustrates many of my arguments about the principles of communication engineering. It is an "impairment," an interference with an otherwise-controlled transmission. It counts as noise even when the "talk" manifests as an intelligible voice, simply because it is unwanted in a given channel. Crosstalk was identified as a problem of telephony as early as 1879, when Manhattan-to-Brooklyn service was first established. During the construction of the Brooklyn Bridge, four cables—each containing multiple wires—were placed inside a temporary handrail that spanned the structure. Conversations jumped between the wires, and engineers responded by trying to insulate each circuit with cloth, gutta percha, and other materials. Later, more complex techniques for maximizing the capacity of the telephone network turned out to exacerbate crosstalk. After the invention of the vacuum tube and the electrical filter, telephone "carrier systems" began to convey multiple signals down a single line, using a separate frequency channel for each message. This "multiplexing," which eventually included the separation of messages in time as well as frequency, helped make telephony affordable and available to an immense number of users. At the same time, multiplexing was fraught with bleed-through between channels.

Thus there has been an ongoing battle between intelligibility and economy; communication engineering generates its own impairments as often as it delimits signal from noise in the extra-medial environment. In his essential book *On Human Communication*, published in several editions beginning in 1957, Colin Cherry defined cross-talk and similar transmission disturbances as at once endemic and "the ultimate limitations to communication."

D. M.: Looking through your work, I notice an approach to the history of communication engineering that is acutely observant of how tangled research problems can be. The way, indeed, that communication engineering can generate its own impairments is complicating as much for communication historians as disability historians, let alone someone concerned with the interaction of the two. As you move through this mess you are able to find fascinating connections. Recent work of yours, for instance, describes the relationship between telephone engineering and research on the Deaf and hearing impaired; how mobile, mechanical hearing aids were instrumental in shifting to a conception of sound as signal; and how Optical Character Recognition technology is rooted in technologies meant for Blind readers.

I wonder if you could speak to how you approach this tangle of problems, how you choose a stitch to pick at or how you would characterize these inextricable links between communication technology and disabilities.

M. M.: Disability has been central to media theory, with communication technologies repeatedly figured as prosthetics, or as extensions for universally impaired modern humans. "The deaf" and "the blind" have especially haunted media studies, recurring in faint outline across histories of the telegraph,

telephone, and phonograph. This centrality is paradoxical, because disability tends to vanish from media narratives after it is forcefully invoked (e.g. as the primitive origin of a given technology or an iconic case of its use.) The situation is comparable to that of exemplarity, in which a type or kind is made to represent a set within which it is not included. I think of the more deliberate rhetorical move in media studies as an exemption, where disability is singled out as an exemplar and then excluded or removed from the record.

I began to research the coupling of disability and media inductively; I wanted to understand the ubiquitous allusions to deafness, in particular, in the secondary literature on communication technologies. Was this merely an example of what David Mitchell and Sharon Snyder call "narrative prosthesis," in which disability provides a convenient symbol for postmodern theory? Or was it an indication of a broader discourse network in which deafness and technical media have been co-constituted? The latter turned out to be true. After seven years of archival research—which involved teasing out links between communications research centers such as AT&T and the world of deaf schools and rehabilitation agencies—I'm now completing a book on the history of "communication engineering," a concept and set of practices that emerged in early twentieth-century telephony and later abetted the development of information theory, digital coding, and cybernetics. I argue that American telephone engineers adapted knowledge from the intertwined fields of phonetics and deaf education in order to convert sounds into material signals as well as "process" those signals in the name of efficient and universal communication.

In *Speaking Into the Air*, John Durham Peters contends that modern technologies like the radio and telephone redefined communication as "transmission at a distance" and, shortly thereafter, as "information exchange."

To this I would add that telephone engineers presumed communication to be always already impaired. Hearing loss, or deafening, served as the primary analogy for signal reception in noise—the meta-condition for all transmission. Given that communication was inherently limited—by noise as well as by bandwidth, medium, and physiology—communication engineering aimed to maximize capacity at every point in the speech chain. The concept of capacity, which initially referred to the volume of inanimate objects, was expanded in this time period (according to the *OED*) to mean "ability to produce." Set in the broader context of mass production and rationalization, the industrial approach to communication sought ways to obtain "full capacity" from humans and machines. Techniques for deaf oral communication—designed to mainstream disabled individuals for productive citizenship—provided some of the templates for economizing and fortifying the speech signal. Specifically: lip-reading, hearing aids, graphic inscription, and tactile vibration indicated ways for speech to be coded, compressed, amplified, visualized and fed-back.

How did this transfer of knowledge occur? Historians of medicine and technology have amply demonstrated that pathology provides insight into physiology, and that disability is a source of technical innovation. Once hearing ability was understood to exist along a continuum, deafness began to guide findings in otology, phonetics, and psychoacoustics; this extraction of the elements of communication could then give rise to new psychotechnical devices. At the same time, "assistive" technologies for deaf and hard of hearing people were frequently mined or repurposed for broad use.

In the field of Deaf Studies, hearing loss has been reconceived as deaf gain to account for the new representations and forms of community afforded by bodily and communicative difference. I've tried to make sense of the commodification of deaf gain by twentieth-century communication engineers;

there are at least three ways this gain gets relocated from the deaf world and converted into disability capital. The first is cross-purpose collaboration, which occurs when a disability-affiliated group works on a project with a medical or engineering firm—but toward different, often conflicting ends—providing labor, funding, or access to test subjects. The founding of Bell Telephone by Alexander Graham Bell and the parents of two of his deaf students established a path-dependence for its successor corporation, AT&T, to collaborate with local deaf and hard of hearing communities. The second means is technology removal, the more direct appropriation of devices, components, information, and techniques. I intend this term to recall "technology transfer," the process whereby inventors (often universities) license or otherwise commercialize their research. Technology removal, however, is detrimental to the innovator, causing exclusion from the development process and/or the final product, as well as loss of historical attribution. Central to my project is a retelling of the emergence of electronic media, with deaf and hard-of-hearing actors as lay experts, educators, manufacturers, and engineers. The final mode is that of the assistive pretext, whereby disability serves as a precursor and pretense—a justification for research funding, or the test market for a technology that is ultimately directed elsewhere.

Although the logic of communication engineering creates the expectation that human communication intrinsically requires repair or improvement, this paradigm does not universalize disability. In the context of telephony, engineers have always drawn lines between "normal limitations" and actual disabilities, between impairments located in the medium and biological hearing loss. Technical media have often been analogized to people with disabilities; rather than being prostheses, they require their own special

components to interface with humans. People with disabilities, moreover, have routinely been excluded from the media systems they've helped to construct—the relationship between telephony and deafness is the classic example. From inaccessible design to stigmatizing representations, media clearly compound or generate disabilities. Media scholarship, through its exemptions, has in its own way also been disabling.

D. M.: To echo Cherry's "ultimate limitations to communication," let's talk about the possibilities limitations of historical work. You've undertaken large-scale projects that both examine the intersection of disability and communication engineering and the mobility of ideas from one discipline to the other. As you describe, a topic like "talk" is a rich, un-mined vein for thinking through unexamined issues of personalization, intimacy, and social expectations.

Let's say you've firmly established the role disability research played at the nexus of compression and communication engineering in the early 20th century; as a researcher and a teacher—a person whose students are themselves looking for untapped veins—how do you see the productive *talk* between disability studies and the history of technology developing?

M. M.: In 2000, Paul Longmore and David Goldberger surveyed the field of history and were able to conclude that most of their colleagues kept away from the topic of disability. In those subfields where impairment could reliably be found—for instance medical and policy history—people with disabilities were never narrative protagonists. In fact, they were hardly even "actors," having been incapacitated by rhetorical conventions rooted in a broader—and seemingly total—discourse of disability as pathology and helplessness. Two

years later, Katherine Ott made a related claim about the history of technology in her introduction to *Artificial Parts, Practical Lives: Modern Histories of Prosthetics*. Despite the ubiquity of the prosthesis metaphor, there were few histories of actual devices and everyday use. And, although disability theory burgeoned in the 1990s and 2000s, much of the work responded to medicine and technology through critical disengagement.

Thanks to "the new disability history" that Longmore helped found, as well as histories of technology like *Artificial Parts* (co-edited by Ott, David Serlin and Stephen Mihm) and early work on disability and digital media by Gerard Goggin and Christopher Newell, we're now witnessing abundant exchanges between disability and technology studies. The near-future can be predicted by recent dissertations produced at the intersections of these fields. A slice of this "talk" includes the following:

1) Renewed attention to older work on disability and technology, whether canonical or "neglected." For example, the American Foundation for the Blind and the Library of Congress published early histories of talking books that are being newly examined by researchers (myself included) who are interested in the diversity of print formats and reading modes.

2) An elaboration of cyborg and posthuman theories by scholars variously trained in disability studies and STS (Science and Technology Studies). Although projects in this vein might run at cross-purposes—for example Emily Smith Beitiks' 2012 University of Minnesota dissertation on the "techno-makeover" and Hélène Mialet's *Hawking Incorporated*—they overhaul a line of thought that seemed to

stagnate in the late 1990s. Donna Haraway, too, has revisited the topic of disability, namely in a 2007 piece about her father's crutches and wheelchair ("Able Bodies and Companion Species") which situates the author quite differently than did "The Cyborg Manifesto." Many other graduate students and postdocs are investigating the everyday contexts of prosthesis; see for instance Cynthia Schairer (Ph.D. candidate, Sociology, UC San Diego) and Laura Mauldin (Ph.D., Sociology, CUNY Graduate Center).

3) Scholarship that critiques the default rhetoric of "access" and "participation" as related to new media. Such work is being done by some who take disability as their focus—like Elizabeth Ellcessor, who completed a dissertation at the University of Wisconsin-Madison this year on the history of web accessibility, and Elizabeth Petrick, a Ph.D. candidate in History at UC San Diego who studies personal computer accessibility. For other scholars—like Mary Murrell, a postdoc at Madison writing an ethnography of mass book digitization—disability is one theme among many. In another recent dissertation, historian Bess Williamson, now assistant professor at Columbia College Chicago, traces the emergence of accessible and universal design practices in the twentieth century. Finally, with regard to "access," I think we'll see more work on *media impairments* such as print disability.

4) Critical and interrogative design. Through artifacts and texts, designers like Graham Pullin and Sara Hendren provoke inquiries or interventions into established assumptions about disability. Here

possibilities for "minor" or even "separatist" media might oppose the paradigm of universal communication; what Pullin calls "resonant design" links disparate groups through shared use.

5) Research into disability and global infrastructure. Michele Friedner, a postdoctoral fellow at the Massachusetts Institute of Technology, has studied the call centers of high-tech multinational firms that employ deaf people in Bangalore. In another mode, Julie Passanante Elman and Robert McRuer have mapped one of the transnational chains of rehabilitation: prisoner groups in the U.S. who are supposedly "rehabilitated" as they restore used wheelchairs for global charitable distribution.

6) Novel articulations between existing work in technology studies and disability studies. In their 2012 article, "Sound Studies Meets Deaf Studies," Friedner and Stefan Helmreich draw these fields into conversation, refusing the presumption that they are opposed. Deaf communicative practices, for example, are used to enlarge the given definitions of music, talk, sound, and listening. Visual interaction and vibration become possible components of acoustic experience.

Although this list is hardly comprehensive, I think it can be said that this work aims for praxis, or enacted theory. A joining of analysis, intervention, and activism is common to the fields from which these scholars hail: disability studies; cultural studies; science, technology, and society; values in design.

Mara Mills works at the intersection of disability studies and media studies. Her research and teaching interests include communication history, telephone and mobile media studies, science and technology studies, and disability theory. Her current book project traces the historical associations between deafness and communication engineering in the telephone system. Other projects include: a history of talking books, reading machines, and print disability; a collaborative study of the history and politics of "miniaturization" in the electronics industry. Mills has lectured widely, including recent talks at National Tsing Hua University (Taiwan); the Institute of Media Archaeology at Kulturfabrik Hainburg (Austria); CNRS/Université Paris Diderot; and the Max Planck Institute for the History of Science (Berlin). She comes to NYU after two years as a Mellon Postdoctoral Fellow at the University of Pennsylvania.

Dylan Mulvin is a PhD student in the Department of Art History and Communication Studies at McGill University. He is writing a dissertation on the practice of prototyping and standardization, stretching from the metric system to secret shoppers. His work also concerns the intellectual history of cultural studies and critical theory in relation to contemporary issues of labour and the workplace.

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