

■ **Terra Edwards**
Saint Louis University
terra.edwards@slu.edu

Re-Channeling Language: The Mutual Restructuring of Language and Infrastructure among DeafBlind People at Gallaudet University

This article is concerned with the re-channeling of language. It asks: what role does the material environment play in turning a visual language into a tactile language? To pursue that question, I examine language and infrastructure among DeafBlind people at Gallaudet University. Since 2005, aspects of the local urban landscape have been designed with the practices of Deaf people in mind. Recently, under the influence of the protactile movement, attention has turned to the tactile dimensions of design. As advisors, practitioners, and consultants contributing to these efforts, DeafBlind people seek not only to broaden the range of sensory channels linking them to their environment, but also to create environments that reinforce those connections across linguistic, sensory, and environmental domains. Drawing on the notion of “channel” as it has been applied and developed in linguistic anthropology and related fields, I argue that the re-channeling of language among DeafBlind people at Gallaudet implicates channels of transmission. It cannot, however, be reduced to an effect of their affordances. Rather, the signer’s perceptions of what is possible in communication are shaped by more general perceptions of what is possible in life, and what is possible in life depends on infrastructure. [language and infrastructure, channel, affordance, protactile, Deaf-Blind]

Introduction

This article examines the mutual restructuring of language and infrastructure among DeafBlind people at Gallaudet University, the only university in the world with a bilingual mission that includes both signed and spoken language.¹ Since 2005, “Deaf Space” design has been changing the urban landscape in and around Gallaudet by way of new walkways, buildings, furniture, systems for modulating light flows, educational technologies, and other modifications to the environment designed with the practices of Deaf people in mind (Bahan 2009; Hales 2013; Hansel Bauman 2014; Malzkuhn 2007; Sanaglang 2012; Sirvage 2015, 2017). Recently, Deaf Space has begun to incorporate DeafBlind perspectives, thanks to the national “protactile” social movement (Clark 2014, 2017; Granda and Nuccio 2018), which has now touched down at Gallaudet (McMillen 2015). This movement, which began in Seattle in 2007, is based on the idea that all human activity can be realized

via touch—that hearing and vision are not necessary for copresence, navigation, interaction, or communication. Protactile discourse and the principles it contains² are a first step toward reimagining how DeafBlind practices are organized in particular places. Where the discourse is received, groups of DeafBlind people decide among themselves how the principles will be realized. From there, the first problem that arises is not language, or even representation, but the more fundamental problem of “residence in the world” (Kockelman 2006).

How does one reside in the world? And when relations that link us to others and to our environment are disrupted, how do we put them back together? Protactile DeafBlind people in Seattle addressed these questions by re-channeling³ themselves to their environment. They turned away from interactional patterns organized along visual lines and sought out new, tactile modes of engagement (Edwards 2014b). Protactile DeafBlind people in Washington, DC, have been in direct and relatively sustained contact with the Seattle community and have acquired many of their practices. However, the people involved, their histories, and their environment differ from Seattle and this has affected how protactile philosophy, principles, and practices are interpreted and expressed. Of primary importance to this article, the DeafBlind people I knew at Gallaudet were steeped in discourses about the potential of architecture and infrastructure to reinforce cultural practices, including the use and preservation of language. The idea that infrastructure might amplify, reinforce, or hinder the emergence and development of language appeared as common sense to many of them.⁴ This perspective subsumed and took precedence over the linguistic dimensions of protactile practice, despite a general familiarity with, and interest in, linguistics. In my three years with protactile people at Gallaudet, the similarities between language and infrastructure and the many ways in which they interface grew increasingly prominent in my mind.

From a linguistic perspective, protactile people are faced with the task of re-routing, or “re-channeling” their language to make it perceptible. However, as I have shown in earlier work, channels of transmission cannot be understood in isolation. Rather, they are caught up in, and organized by, patterns in navigation, orientation, and interaction (Edwards 2014a). One of the deciding moments in Seattle’s history was when DeafBlind leaders reduced reliance on sighted interpreters, opting whenever possible for direct, tactile communication instead. Prior to that moment, and generally speaking, signs did not travel from DeafBlind person to DeafBlind person. Instead, they were routed through several sighted relays. In order to establish direct links between DeafBlind people, the local authority structure had to be altered, as well as what counted as legitimate, valued moves within it (Edwards 2014b). Based on these observations, I have argued that changing a visual language into a tactile language begins not with the language, but with the reconfiguration of the social and interactional fields to which it articulates. As that process unfolds, channels of transmission fall in line (Edwards 2014a).⁵ The goal of the present work is to build on these insights by following Gallaudet’s protactile community into the infrastructural substrate that extends beneath language, interaction, and society.⁶

Toward this aim, I draw on the notion of “channel” as it has been applied and developed in linguistic anthropology (e.g., Hanks 1990; Jakobson 1990; Kockelman 2010), the study of signed languages (e.g., Brentari 2011; Stokoe 1960; Klima and Belugi 1979; Meier et al. 2002), and among scholars interested in embodied interaction, gesture, and sensory orientation (e.g., Bahan 2009; Goodwin 2006, 2007; Green 2014; Hanks 1990; Keating and Mirus 2012; Sirvage 2015; Streeck et al. 2011; Tulburt and Goodwin 2011). I argue that the reconfiguration of language among DeafBlind people in Washington, DC, implicates channels of transmission, and yet cannot be reduced to an effect of their affordances; channels of transmission are shaped by broader processes of circulation and interpretation that link language users to each other and to their environment—not only the natural environment, but also the architectural and infrastructural forms that undergird modern life (Larkin 2013; Star 1999).

In the first section of the article, I explore this broader conception of channels in relation to Gibson's notion of "affordances" (1986). This yields a *signer*⁷ whose perceptions of what is possible in communication are instances of more general perceptions of what is possible in life. For example, the affordances of a lake's surface are different for a human and a water bug. The way humans and water bugs communicate is also different, and the two facts are not unrelated. Following Jakob von Uexküll (2010 [1934]), I entertain the possibility that forms of communication derive from forms of life because the complementarity of the organism and its environment constitutes the ground of perception. According to Uexküll, the sensations we are capable of registering are projected outward to create a world, which we then perceive as features of the world itself. This process guarantees the sense that we are at the center of our world and that that world feels perfectly complete to us. Except, as I show toward the end of the second section, for protactile DeafBlind people, this process is vulnerable to being disrupted by cultural producers with conflicting perceptual and interactional dispositions. In general, tendencies of cultural producers are reinforced by people who inhabit the spaces they have designed, which means that there is a tendency for channels linking people to one another and their urban environments to narrow in homogenizing ways (Benjamin 1999; Bourdieu 1970; Hanks 1990; Lynch 1960; Panofsky 1973; Simmel 1972). Without intervention, the tactile sense might disappear from urban environments altogether.

In the second section of the article, I examine some of the ways that Deaf and DeafBlind people at Gallaudet are working to broaden the range of channels organizing urban environments in order to do things like preserve sign language, create new forms of value, and participate more freely in economic exchange. In the following section, I look at the transformations that occurred among groups of DeafBlind people at Gallaudet who, when I was conducting fieldwork, were aiming to augment their relationship to the environment. I show how they were accomplishing this on the one hand by reorganizing their own patterns of perception and interaction as they became protactile people, and on the other, by reorganizing their environment.

I conclude in the final sections of the article by reflecting on the role of the material environment in shaping channels that transmit linguistic signals. I argue that Gallaudet's protactile community has offered us a compelling theory: first, reconfigure interaction, then re-channel the urban environment to support those interactions, and finally, as this foundation is materializing, notice how channels of transmission are aligned with the world around them. In other words, changing a visual language into a tactile language does not begin with language, but with Uexküll's perfect world and the infrastructural and architectural interventions that stand to either threaten or bring about its existence.

Channels

Channels can be thought of as "relations that link two nodes." But to complicate things, they are also "nodes that link two relations," they participate in larger networks and systems, and they can be decomposed into smaller networks and systems (Kockelman 2010 via Serres 2007). For example, phone wires, sight-lines, and tunnels are part of telecommunications, sensory, interactional, and transportation networks. These networks contain nodes occupied by talkers, watchers, travelers and "semiotic agents more generally," each of which is internally complex (Kockelman 2010:411). Semiotic agents don't just relay signs—they receive them, develop them, and direct them toward other semiotic agents using networks and systems of all kinds (Kockelman 2010:415). Each channel, each network, has properties, capacities, and vulnerabilities of its own, which means that signals can be intercepted, tampered with, dampened, or lost entirely (see Kockelman 2010:409–413). Indeed, what goes into a channel is rarely the same as what comes out (Kockelman 2010:411).

Among scholars of gesture and signed languages, channels of transmission are not viewed as precarious places populated by enemies and vulnerable to failure, but they are viewed as having certain “affordances” (e.g., Perniss et al. 2015; Sandler 2013; McNeill 2005; Quinto-Pozos and Parill 2015; Levinson and Holler 2014). For example, a type of channel (e.g., visual-gestural or oral-aural) has affordances for a type of expression (e.g., “imagistic” or “analytic”) (McNeill 2005). A class of verbs (e.g., “directional verbs”) exists thanks to the affordances of a channel (e.g., visual-gestural) (Meier 2002). These affordances are constrained by sensory-motor and cognitive capacities. Language, more specifically, requires channels that enable the discrimination of features in the perceptual stream. And yet, the mind of the language user does not require any specific channel; if one channel is lacking the necessary affordances, another can be used (e.g., Klima and Bellugi 1979). But what is involved in this substitution of channels?

Working his way toward a “structuralism of channels”⁸ Kockelman (2017:55) argues that “the relation between a signer and an interpreter (qua channel) cannot be properly understood unless one takes into account the way that relation can combine with other such relations, and substitute for other such relations, within some larger system (such as a network).” For example, the affordances of visual-gestural channels only appear as such when contrasted with the channels exploited by spoken languages. According to Kockelman (2017:56), this is true of nonlinguistic channels and forms of media more generally: “What a particular channel . . . enables one to do, or constrains one from doing, can only properly be understood when compared and contrasted with other possible channels—channels that it can substitute for, or combine with (as well as displace, replace, or efface) in some environs, or era, given the actions and interests of its inhabitants.”⁹

This is helpful for understanding the re-channeling of language among DeafBlind people, since as I will show, channels that transmit linguistic signs are part of larger patterns in how protactile people live, where they go, and who they interact with. Protactile channels appear at forks in the road in the flow of interaction—they are forged as principled alternatives to routes that are not chosen, and over time, they become worn pathways, that guide the way for others (see Edwards 2017). Channels are caught up in these reroutings, but the protactile movement didn’t start there. In the beginning, DeafBlind people intervened in conventions that were widespread at the time in order to re-consider their environment—not their language (Edwards 2014b). They were not thinking: *how can I get this linguistic sign from me to you*—they were thinking more broadly about what it would mean to be in the world together and what that world might have to offer. As they oriented to their environment (including one another) in new and more tactile ways, their language was re-channeled and internally reconfigured (Edwards 2014a, 2017). These changes were not only related to the affordances of the channels that link signers to interpreters, but also the channels that signers and interpreters are caught up in as they move through and interact with the environment. This broader conception of “affordances,” which takes into consideration the organism as a whole in relation to its environment, is, in fact, what Gibson meant when he introduced the term.¹⁰

According to Gibson (1986:134), organisms interacting with their environment learn to recognize objects not by discriminating qualities (e.g., size, shape, color, texture), but by perceiving *affordances*. A surface can be climbed on insofar as is it “climb-on-able”; it can be walked on insofar as it is “walk-on-able.” So while the surface of a lake can be viewed as has having certain objective qualities or properties—flatness, extension, nonrigidity, etc.—it has very different affordances for humans and water bugs (Gibson 1986:127). From this perspective, the affordances that an organism grasps in a particular channel of transmission are shaped not only by its cognitive and sensory-motor capacities, but also by how it lives, where it goes, and who or what it interacts with. What one animal sees as a pathway, a seat, a place for hiding, or a home, appears to another animal as an obstacle or a dangerous place.¹¹

Moving through the landscape, affordances appear to the organism as features of the objects themselves, which call forth action in particular ways: "The postbox 'invites' the mailing of a letter, the handle 'wants to be grasped', things 'tell us what to do with them' (Gibson 1986:138). Thinking in terms of affordances is not the same as thinking in terms of classifications. Classifications lend themselves to categories, while affordances lend themselves to life. In life, our environment doesn't just supply us with the specifics to go with our schemas. It anticipates us; it knows how we live, where we go, who we interact with, and it offers us pathways, trajectories, and protected places. According to Uexküll, this fit between the organism and its environment is internalized in the organism and forms the very ground of perception (also see Ingold 2009). He says it works like this: the organism notices an outside intervention and responds. For example, in response to "waves in the ether, pressure, or electric currents," the optic nerve registers "the sensation of light" (Uexküll 2010 [1934]:47). Each type of cell in the body has either a "perception sign" or an "effect sign." Brain cells coordinate the two so that sensations representing perception signs are projected out as features of things in the world. In this way, "the sensation 'blue' becomes the 'blueness' of the sky, the sensation 'green' becomes the 'greenness of the lawn' and so forth" (Uexküll 2010 [1934]:48).¹²

This cycle guarantees that each organism has the experience of being at the center of its own world and that that world is felt to be, in some crucial sense, *complete*. "All animal subjects," says Uexküll (2010 [1934]:50), "are inserted into their environments to the same degree of perfection." He offers the "marine medusa" as a vivid illustration of this idea, which is a creature constituted entirely by a swimming pump whose purpose is to filter nutrients out of sea water.

The sole manifestation of life [for the sea medusa] consists in the rhythmic up-and-down swinging of [its] elastic umbrella. The ever-constant pulsation keeps the animal floating on the surface of the ocean. At the same time the stomach distends and contracts alternately, driving sea water in and out through fine pores. The liquid content of the stomach is propelled through labyrinthine digestive canals, whose walls absorb the nourishment and the accompanying oxygen. Swimming, feeding, and breathing are carried out by the same rhythmic contraction of the muscles on the edge of the umbrella. To ensure continuity of this motion, eight bell-shaped organs are located on the periphery of the umbrella . . . , whose clappers strike a nerve end at each beat. The stimulus thus produced elicits the next umbrella beat. In this way the medusa gives herself her own effector cue, and this releases the same receptor cue, which again elicits the same effector cue *ad infinitum*. In the medusa's world, the same bell signal rings all the time, and dominates the rhythm of life. All other stimuli are cut off. (Uexküll 2010 [1934]:32)

The sea medusa is at the center of her world, and that world feels to her, perfectly complete. When DeafBlind people talk about animals (which is discussed in the next section), it is often this kind of completeness they highlight as a utopic horizon. A world perfectly suited to a nonvisual form of life makes new kinds of tactile cities, modes of interaction, and forms of life feel possible. It also highlights the shortcomings of the present environment. Here the question becomes: if the organism is no longer suited to its environment, what has to change to bring them back into alignment? Uexküll does not explore this question, but Gibson does. While Uexküll sees this perfect fit between organism and environment everywhere, Gibson makes room for the possibility that both environments and organisms might change in ways that disrupt that fit. Luckily, when disruptions occur, the organism will discover (to their great delight!) an excess of affordances with which a new fit can be fashioned:

There are all kinds of nutrients in the world and all sorts of ways of getting food; all sorts of shelters and hiding places, such as holes, crevices, and caves; all sorts of materials for *making* shelters, nests, mounds, huts; all kinds of locomotion that the environment makes possible, such as swimming, crawling, walking, climbing, flying. (Gibson 1986:129)

And yet, this abundance of possibilities is likely to go unrecognized insofar as the functions things serve are influenced by the functions they have served in the past. In other words, affordances may not be recognized on a moment-to-moment basis by individual organisms. Instead, they may be a kind of “self-channeling channel” wherein “a signer has access to an interpreter because a signer has had access to an interpreter; a message arrives at its destination because similar messages have arrived at similar destinations” (Kockelman 2010:415).¹³ For example, riverbanks, footprints, and wheel ruts all direct traffic along a particular path because others have traveled along that path. In the same way, habits, dispositions, and techniques of the body narrow the number of potential channels by making some and not others feel familiar, obvious, or natural (Kockelman 2010:415). Put another way, we become channeled to our environment and the objects and organisms that populate it in ways that restrict our world.¹⁴ Modifications to the environment have the potential to reinforce, interrupt, or intensify those restrictions.

Edward T. Hall (1990 [1966]:2) recognizes this when he says that the experience of an organism in its environment “cannot be counted on as a stable point of reference—because it occurs in a setting that has been molded by man.” And there is a circularity to human-environment interaction and a tendency toward homogenization so that the environment gets built up around patterns of perception and interaction, and also reinforces and shapes those patterns (Benjamin 1999; Bourdieu 1970; Hanks 1990; Lynch 1960; Panofsky 1973; Simmel 1972). At the confluence of Deaf Space and the protactile movement, the aim is to intervene in these loops by broadening the range of channels that link humans to their urban environments.

Re-Channeling Gallaudet for the Preservation of Sign Language

Protactile people take Uexküll’s (2010 [1934]:50) claim for granted—that all animals “are inserted into their environments to the same degree of perfection” and they seek out channels in their environment that will help realize that potential.¹⁵ In Gibson’s terms, they are looking for their niche. Kockelman (2010:416) points out that where new channels are forged, one encounters both top-down and bottom-up pressures, since connections between signers and interpreters are organized by norms, standards, states, and markets, on the one hand, and rituals, ceremonies, or other performative activities on the other. Top-down pressures at Gallaudet have been exerted by communication policies, standards concerning access and inclusion, and, of primary importance here, urban development projects, which extend far beyond campus, and at the same time, are subsuming and transforming its internal structure. The overall aim of these projects is to open up routes for and intensify the circulation of people, languages, novel sensory experiences, and other valuable things. At Gallaudet, language is one of the valuable things that circulates, and at the same time, it is something that must be preserved in the face of increasing exposure to outsiders. To address this issue, administrators, planners, and developers are designing literal pathways.

Union Market, which is located across the street from Gallaudet is taken to be a model for what the surrounding neighborhood should become. In the market, Deaf and hearing people interact so frequently that employees and regular patrons have learned enough American Sign Language to talk about coffee, Korean tacos, sea urchins, and the weather. According to the director of Gallaudet’s Office of Design and Planning, developers and investors see this as a unique kind of cultural value. People love San Francisco, he explained, because there are distinct cultural districts (no one would confuse Chinatown for the Castro), and because of this distinctiveness, each district counts as a consumable, valuable, cultural experience. When people come to Union Market, they are consuming culture. They are at the edge of a Deaf world, peering in—experiencing its rhythms, its patterns of response and adjustment, and the consistent “hum” of visual chatter. Meanwhile, under the influence of the protactile movement, DeafBlind people are developing novel communication

practices, which the university is periodically asked to adjust to, and support, on an institutional scale. Under pressure from both stake holders and developers, Gallaudet's Office of Design and Planning has been looking for ways to create infrastructure, which will on the one hand, reinforce communication practices among Deaf and DeafBlind people, and on the other, convert those practices into new forms of value as the surrounding area is transformed into a center of "culture, creativity, and commerce."

In order to understand how protactile practices fit into this larger picture, I interviewed Henry,¹⁶ one of the administrators involved in design and development. The interview took place at a table in a restaurant at Union Market. Sitting across from me, Henry took out a piece of paper and drew a rectangle to represent the building we were in. Then he asked me if I had ever been to the visitor's center across the street at Gallaudet. We laughed. The Visitor's Center is dark. When you walk in the front door, you are confronted by a person sitting at a desk. They look up at you with suspicion and ask you who you are there to see before pushing a sign-in sheet in your direction. Once you have signed the sheet, it is not clear where you should go. Beyond the desk there is a vacuous, unstructured space, interrupted by pillars with TVs attached to them. The TVs are announcing seemingly random facts about the place, the people in it, recent events. It is not clear if one should proceed from one pillar to the next, seek out a stairway (one doesn't even begin to know where to look), or go back to the desk and ask for directions to the rest of the building. In this moment of confusion, the back door and the windows next to it call out—Leave! Exit! Go to the light! This scary little maze, Henry explained, will become a place that draws people in and through the campus. He drew a simple geometrical diagram for me (it was a plan for the future).

First he drew a line from Union Market to the Visitor's Center at Gallaudet. Then he drew a second line from the Visitor's Center to the NoMa/Gallaudet metro station. This simple pair of pathways, he told me, will become a channel that invites people to move through the campus. The emphasis in doing this, he said, is on making things more permeable and intensifying circulation and exchange. In the hallway outside of Gallaudet's Office for Campus Design and Planning, large posters propped up against the wall contain glimpses of what permeability might look like. In one image, the large dark parking structure, brick wall, and iron gate that currently separate the campus from nearby businesses is replaced by an open grassy area, a bookstore, retail spaces, and a plaza. Some of the people lounging there are using signed languages and some are using spoken languages. They are reclining on the grass reading a book they've just purchased or else they are stopping for a chat on their way back from lunch. But this smooth, light-filled image makes some people nervous. Is it a model for economic integration or is it the beginning of the end for Gallaudet qua "Deaf Space"? To address this concern, zones are being created; there will be zones where people experience novelty or mix with the outside, and others where they protect what is theirs. You don't want to turn Deaf people into a spectacle, Henry told me, nor do you want to create a multicultural melting pot. The goal is to create a system of channels, networks, and pathways that facilitates the transfer of things, people, and ideas over space, while at the same time, preventing them from becoming indistinguishable. Here we see the tension between the perfect world that Uexküll described, and the visions of the cultural producers. The problem is: will development projects support a complementarity between the environment and the Deaf and DeafBlind people who inhabit it, or will they undermine it?

As DeafBlind people joined the conversation, it became clear that the Deaf answer to this question was easily transferred; that is, the logic outlined above applied not only to the relations and boundaries between Deaf and hearing people, but also to the relations and boundaries between Deaf and DeafBlind people. DeafBlind people have something to offer the larger Deaf society around them insofar as their cultural practices are distinct and in circulation. This infrastructural approach to cultural

difference is not about “mainstreaming,” “inclusion,” or “access.” Instead, the aim is to sharpen boundaries between groups, thereby generating and protecting value specific to those groups. Subsequently, groups are linked to one another and circulation is catalyzed. Architecture and infrastructure fit into this in several ways. First, Deaf Space buildings are markers of prestige and beauty, which draw outsiders in and offer opportunities for exchange. Second, pathways that link buildings facilitate interaction between insiders, outsiders and everything in between. Finally, the environment offers “enclosures,” “incubators,” “eddies,” and other protected spaces designed to “preserve sign language” and other local practices by supporting their continued use and engagement.

This formulation—a kind of successive embedding of distinct cultural groups meant to generate value and intensify exchange—took time to develop. According to one of the Deaf Space practitioners I interviewed, there were three moments in the incorporation of DeafBlind people into Deaf Space. In the beginning, he said, there was the typical “access” mentality—we don’t want people to sue us so we have to make sure DeafBlind people are safe. Safety was at the center of things and that prevented any substantive dialogue, or actual inclusion.¹⁷ Then there was a second moment when DeafBlind students started saying: *Since we pay to be here, we should get to be involved in campus life*, and that led to the provision of more interpreters and guides for activities on campus. The third moment is where ideas about inclusion and access started to recede. Here, protactile DeafBlind people started asking questions about what it means to “participate”: *If an interpreter is describing information about a visual environment to you is that participation? If you have to use a cane, is it really your environment? What would it take to make Gallaudet feel less like a place we had access to and more like our home?* These kinds of questions that rely on a complementarity between the organism and its environment, led to a creative explosion of possibilities for design, planning, architecture, education, research, and many other areas of social life, which were also seen as having potential value in larger networks of circulation.

In 2016, protactile leaders were invited to Gallaudet for a two-day meeting with administrators, researchers, and students. During those two days, protactile design was a focus of discussion. DeafBlind people were subsequently consulted as advisers to the design process, including John Lee Clark, who later wrote about his vision for the campus.¹⁸ In Clark’s protactile campus, open spaces are threaded with tactile and olfactory landmarks; a system of skyways arches up over streets and dangerously unstructured expanses of concrete; textured pathways with hip-height railings “funnel” Deaf and DeafBlind people into intersecting trajectories; and to prevent protactile practices from being absorbed into the surrounding Deaf environment, there are tunnels that dip down into “deep protactile zones” where (thanks to the absence of light) only the most protactile people will go. These structures would reinforce, amplify, and protect protactile practices and at the same time, offer novel experiences to sighted outsiders (both Deaf and hearing). They would draw different kinds of people, living very different kinds of lives, into intellectual, economic, and cultural exchange.

In design meetings, hearing and sighted architects and planners—total outsiders—were taken with ideas like these, and they started to reconsider some things, asking questions like: *Why are walls flat? Why not carve contours into them, which, like a riverbed, draw your hand to all the relevant things: the fire alarm, the window, the doorknob. Since we plant grass, and we know people walk on it, why not plant herbs, which release fantastic smells when walked on? If we built floors out of materials that were more sensitive to vibration, might they extend the “sensory reach” of those standing on them? Would American cities be more beautiful if they were designed to be felt and not just seen? When “access” was surpassed, protactile practices started to be seen not in terms of what DeafBlind people needed, but rather in terms of their potential to generate value for the university, for Deaf society, and for the world in general.¹⁹*

Becoming a Walrus in a Walrus Town: Ritual and Re-channeling

While Deaf sighted people have been calling for the preservation of their language and their practices, for some time,²⁰ protactile people are still figuring out what they might want to preserve. The environment is permeated with affordances that have yet to cohere into something that feels perfect and complete. For me, this became clear any time the environment failed to support the coordinated actions of the protactile group I was participating in—when the tables felt too big, the walkways too narrow, or the floor too hard. Sometimes when we were repositioning, or otherwise accommodating, someone would throw out an image of a blind animal perfectly suited to its environment—a worm or a mole—and everyone would laugh. When the environment is thwarting your every effort, the thought of a worm in its worm-tunnel can make everyone happy.

While this sort of thing happened in Seattle just as much as it did in DC, the response was different. In addition to being more focused on architectural and infrastructural solutions, DeafBlind people at Gallaudet were also, in general, younger, and their DeafBlind identities were less solidified.²¹ Many of them were interested in infrastructure not only because of its capacity to reinforce practices, but also because they saw it as something that could help them become blind, both in the sense of developing a DeafBlind identity, and in the sense of developing the embodied knowledge necessary to inhabit a tactile world. Elliott had been involved with the protactile movement for about two years when I interviewed him; and his social, political, and embodied orientations were hovering somewhere between Deaf and DeafBlind. I asked him after spending more time in protactile environments over the past two years, what had changed and what problems arose. He told me that the problem with being DeafBlind is that you can't experience your deafblindness. "It's not like I see black areas in my visual field or something," he said. "I don't see that area at all and I am not aware of it." Nevertheless, he had gotten used to experiencing its effects: running into people, tripping over things, and so on. Each time one of these events occurred, he inferred the existence of his blindness. The problem with living that way, he said, is that there are these chains of inference and interpretation that undermine your perceptual hold on reality. You learn not to trust yourself, not to seek out patterns in your experience, but instead, to follow instructions, take cues, and internalize the "feedback" of the people around you. He explained that once you have experienced a protactile environment, it is really hard to go back to that tenuous position in the world.

Elliott said that once he had gone through that transition and had become a protactile person, he realized how much of the urban environment had been designed to dissuade touch. He hadn't noticed, for example, all of those hedges or prickly thick plants around the perimeter of buildings that make it impossible to find out if the structure is made of logs or bricks (these bits of information, he said, can be important). He hadn't thought about the fact that in every store there is an arm's length counter that separates you from the person you need to communicate with, nor had he considered all of the glass panels and cases that make it impossible to know what foods and products are available for purchase. As he became a protactile person (despite all of the physical barriers to doing so), the urban environment was recontoured, revealing large gaps and impermeable obstacles—negative affordances—which in addition to preventing him from knowing things, seemed to be whispering, "go away."

These same urban environments are inhabited by hearing sighted-people, and for us, touch is also dissuaded. In a circular fashion, this intensifies the desire (present in some) not to be touched. Over time, the range of sensory channels that lead out into the environment narrows. The DC metro, for example, is a place replete with kinesthetic, thermal, and olfactory affordances. Proximity must therefore be managed. At rush hour, people stand too close. Avoiding inappropriate contact requires vigilance, legs planted wide, gaze fixed on the floor. If a stranger breathes on you, the sound will be barely audible, the smell can vary widely, but the thermal

aspect will be consistent. A stranger's breath is warm, and warmth tends to amplify smells and the exchange of chemical signals. This is the moment when one moves to a new location within the train, gives a harsh glance, or otherwise asserts a boundary. Hall considers responses like these to be characteristic of "noncontact peoples" who he compares to noncontact animals. He writes:

In regard to the use of space, it is possible to observe a basic and sometimes inexplicable dichotomy in the animal world. Some species huddle together and require physical contact with each other. Others completely avoid touching . . . The great Emperor penguin [for example] is a contact species. It conserves heat through contact with its fellows by huddling together in large groups and thus increases its adaptability to cold. (Hall 1982 [1966]:13)

The walrus is another contact species. They pile up in herds on the ice. From a distance, they appear to be a giant, gray, slippery mass. Hall says that some groups of people are like this and prefer to be in contact with one another; those are the contact-people. The others, who do not appreciate contact with their fellow humans, are the noncontact people. Being a noncontact person not only affects relationships with other people, it affects interactions with materials in the environment. For example, noncontact people report that they hate sitting in "upholstered chairs immediately after they [have] been vacated by someone else" and on submarines, they complain about 'hot bunking' or "the practice of sharing bunks, so that as soon as one watch 'crawls out of the sack' the relieved watch takes their place" (Hall 1982 [1966]:57–58). For noncontact people, there is something unpleasant about the thermal traces of others.

To a certain common sense, it may seem natural that blind people would be contact people. However, it is not up to the individual which society she should be born into. And with regard to touch, the material environment is built with particular compulsions and repulsions in mind. If an architect or a planner designed a town for walruses, it would look very different from a town for horses. If a walrus in a walrus town felt a sudden need for space, the environment might not support that impulse. Hall (1982 [1966]:60) asks us to "[t]hink for a moment how young children and infants reach, grasp, fondle, and mouth everything, and how many years are required to train children to subordinate the world of touch to the visual world." This process, he argues, is perpetuated and compounded by our interactions with the manufactured environment. Automobiles, cramped, kinesthetically unengaging urban and suburban spaces, and other features of the North American landscape, sever the self from its thermal, olfactory, and kinesthetic aspects. Ultimately, touch is subordinated or restricted. While, as Hall points out, this narrowing of sensory capacities is detrimental to all inhabitants of North America, DeafBlind people are more sensitive to its effects, and therefore, are uniquely positioned to diagnose and address the problem.

The protactile movement is a political effort to reinstate a wider range of sensory channels linking urban inhabitants to one another and their environment. When the protactile movement converged with Deaf Space at Gallaudet, this effort was approached from both directions. The aim was not only to augment the capacity of the organism to find its niche in the environment, but also to augment the environment in ways that supported the organism—whether through the reorganization of already-present things (reorganizing the furniture), or through the construction of new things (such as systems of tunnels and skyways). Everything from large-scale urban development to the presence or absence of armrests was admissible.

Working from the top down, DeafBlind people at Gallaudet made arguments for protactile forms of value to be circulated in broader networks of exchange, they attempted to intervene in university policy decisions, and they aimed to disrupt current standards around what it means to be included in campus activities. Working from the ground up, they also established new routines and rituals that reconfigured their relationships to one another and the environment.²² One example of this was

the phenomenon of “protactile walking” (which had no counterpart in Seattle). Groups of protactile people started venturing out into public with the explicit aim of “occupying space” in tactile ways. Many of them were just beginning the process of becoming blind, and these excursions were talked about as something that could facilitate that transition. I enjoyed walking with them and every chance I had to join them, I did. We would shuffle around the city together—three, four, sometimes five people packed into the narrow space of a sidewalk—arms linked in arms, canes extended. In the winter, we were like a spider moving around slowly in the cold. We were mostly blind, and in the center, we were warm. We traveled on buses, clicked our way through turnstiles, and boarded trains. When we arrived in places with bright lights, we broke apart and stood swaying like individuals, strange and dissociated.²³ Reflecting on these experiences with a DeafBlind member of the group some time later, a question materialized: *How did we become this tactile thing that asserts itself in the city, takes up space on the sidewalk, and protects itself with its own internal rhythm? Was this some kind of ritual transformation?*

According to Bourdieu (1972:124), ritual facilitates passages from one order to another, and these passages include transformations of the senses, broadly speaking: tastes and distastes, compulsions and repulsions, the sense of necessity, the sense of direction, the sense of balance, the sense of beauty, common sense, the sense of the sacred, the tactical sense. There is no way to peel tactility away from these broader cognitive/evaluative schemes that organize practice. Tactile, motor lines cross-cut most things, and for people who are becoming tactile, they can become lines of transfer—points of connection—for the passage. Urban navigation rituals serve precisely this purpose, helping to facilitate the passage from sighted to blind. Greetings, leave-taking, and other interaction rituals also facilitate the transformation. Sarah McMillen, a protactile graduate of the Deaf Studies MA program at Gallaudet writes about the work she did to restructure greetings in public places while she was a student:

One morning near the end of the spring semester, I was working during my office hours at a large table in [the Sorenson Language and Communication Center, or the “SLCC”]. My head was down, bending over an assignment. Through the corner of my eye, I could see Clayton sitting across from me. I refused to look up at him. I wanted him to become proactive about using protactile, so I continued to work on my assignment. After a few minutes Clayton stood up and walked over to my right. I continued to ignore him until he touched my right shoulder. I looked up at Clayton. Smiling, I said, “Hello, how are you?” Clayton replied saying he was fine, adding, “You know I was sitting and waiting for you.” I replied, “Yes, I know. I ignored you because I wanted you to come to me and use protactile instead of sitting and waiting for a deafblind person to look up at you. Not all deafblind people can see like I do. If you want to become a deafblind advocate, you have to start becoming comfortable with using protactile.” (McMillen 2015:104)

Generally speaking, a ritual isn’t a ritual if you do it differently every time. Given widely varying sensory capacities among protactile people, the most inclusive ritual is the most tactile one, therefore a protactile greeting assumes no visual access. This thinking was transferred from Seattle to Gallaudet with little alteration, except the material environment took on a more central role. DeafBlind people at Gallaudet were primed by their involvement in Deaf Space to think that way and under their influence, I started thinking that way, too.

In my classes (where at least one protactile student was usually enrolled) the furniture appeared suddenly and unfortunately Deaf. Ten or fifteen seats were arranged in a semicircle so that students had visual access not only to the teacher, but to each other as well. This arrangement prevented protactile interaction—the distances were too great and the chairs were trapped behind the tables. Every time we started class, we had to push the tables to the edge of the room and pull the chairs into the center where we could arrange and rearrange them as activities unfolded in class. This was an excellent solution to a practical problem. Interestingly, it also led to a new understanding of what makes a chair a chair. A chair isn’t only sit-on-able. It is

also movable and reach-across-able (no armrests). The environment and the things in it took on new contours—negative affordances were backgrounded, positive affordances were foregrounded, and everything was redefined.

This redefined and recontoured environment quickly accrued political significance. Spaces on campus where the furniture was not movable were not “PT friendly.” For example, McMillen describes a weekly protactile event held in a public café, where many people on campus routinely eat lunch. She explains with frustration that the immovable tables there were barriers to the very activity the café was there to enable: “The lunch was a campus community event for people to converge during their leisure time to use protactile, and the table impeded an effective protactile interaction To [communicate using touch], I would have to stand up and squat slightly or bend over across the table” (McMillen 2015:102). Sometimes in situations like this, a group of protactile people would move onto the surface of the table, or take up space in the middle of a walkway or floor. These choices were explicitly framed as serving a practical function (enabling communication) and a political function (staking a claim on public space).

As practices were transferred from Seattle to Gallaudet, DeafBlind people seemed to experience the kind of conversion that was familiar to me from prior fieldwork.²⁴ But what appeared obvious to them upon converting was different—that the material environment would play a crucial role in the conversion experience as well as the continued development and preservation (or not) of protactile practices. Building classrooms, meeting spaces, and even residences that supported protactile interaction and language were all ideas that were proposed to the administration as ways to improve the performance and retention of DeafBlind students. And there was talk of a uniquely protactile aesthetic, which would emerge out of practical concerns, but ultimately outstrip them. In a recent essay, for example, Clark (2017:3) asks the question: why, very early in the history of the education of DeafBlind children, did they start “assigning each of us a special teacher-companion”? His answer is that DeafBlind ways of living didn’t “look right” to the sighted teachers and administrators who were in charge. He argues that this convention was not really a response to a practical problem, but rather, an aesthetic problem: “It didn’t look good when we went around ‘groping in the dark.’ It didn’t look good for us to cluster together and have too much fun. Education meant we had to sit behind a desk” (Clark 2017:3). At Gallaudet, there was an openness to the possibility that protactile educational spaces might look more like speed dating or musical chairs than classrooms. The protactile classroom might consist of small seating configurations (no more than three students in a group) and a timed rotation, so that each person interacts with each other person, directly. In the age of flipped classrooms and participatory learning, this seemed to many faculty members, administrators, and sighted students like a reasonable way to structure all classrooms. And this led back to the question of protactile design, now more broadly conceived—what would the podium and the PowerPoint and all of those desks be replaced by? What might education look like in the future?

Taking the Floor

While I was conducting my research, there were several Deaf Space projects in the planning and construction phases on campus. In fall 2016, I joined a tour of a nearly-completed building. It was a “pre-punchlist” event, which is an opportunity for the design team to identify problems that should be fixed before a punchlist, or a list of problems, is created. Entering the hallway, I could feel the chalklike floor loosening under my shoes—little clouds of dust were rising up into the air. Joe, the construction manager for the project, stopped. He turned around in front of a damaged area of the floor and addressed the group. “This is one of my top five concerns,” he said. Others agreed; damage to the floor would propagate through the carpet within a matter of weeks, they said. Not only that, these kinds of imperfections could lead to cracking, which could, over time, lead to more serious structural

problems. The group moved slowly down the hallway over each damaged area—reaching their feet out, sliding their shoes across the surface, nodding in agreement.

At the time, I wondered: *why was this material chosen? Who makes floors out of chalk?* One of the members of the design team later explained to me that it wasn't chalk. It was a mixture of gypsum, sand, and water known as "gypcrete" which is poured over wood frame construction. This assembly was chosen because it aligns with Deaf Space design goals, which are the result of years of intensive research, debate, and reflection among students, community members, and Deaf Studies scholars (e.g., Bahan 2009; Hales 2013; Hansel Bauman 2014; Malzkuhn 2007; Sangalang 2012; Sirvage 2012, 2015, 2017). Deaf Space researcher Robert T. Sirvage examined patterns in communication, navigation, and interaction and he found that Deaf people have a different orientation to the space behind them than hearing people do.²⁵ While hearing people integrate their vision and their hearing for 360 degrees of environmental access, Deaf people can only see what is in front of them. He thinks that in order to accommodate that fact, Deaf people attend to the environment in specific ways: they read shadows on the sidewalk and reflections on glass, they are attuned to vibration in the floor, and in a crowded environment, they can often be found with their backs pressed against a wall. When interacting with another Deaf person, Sirvage says, each "takes responsibility" for the space behind the other. If they don't, they will be scolded and "[t]hat emotional response tells us that this way of structuring visual attention is not just a biological fact—it has become a cultural rule for Deaf people. If the rule is violated, trust is violated."

Deaf Space floors are constructed with this in mind using materials and assemblies with specific affordances. Gypsum, sand, and water poured over wood-frame construction dampens many vibrations, but transfers those caused by footfalls, thereby delivering important environmental information. This type of floor enables the Deaf building to take responsibility for the regions of its interior that are invisible to its inhabitants.²⁶ It also enables the building to participate in other aspects of interaction, as well, such as attention-getting. One day, for example, I was trying to get the attention of a student who was bent over, scribbling notes. As is customary in Deaf environments, I stomped my foot on the floor but the floor didn't respond; instead, I felt a shock run up my leg to my knee joint and the student went on scribbling. Our classroom was on the first floor, which was solid concrete, and I realized in that moment: *this is not a Deaf floor.*²⁷

Protactile design pushes designers and planners even further in this direction to consider the capacities that materials have to facilitate, or hinder, interaction. Sirvage, for example, considers benches superior to chairs for protactile design. As I was conducting my fieldwork, I wanted to understand why, so I started paying attention to the differences between the two. One day, I was sitting with a group of protactile people in the lobby of the campus hotel. Two people were conversing on a bench topped with built-in cushions, which responded to the rhythm of signing. Sitting several feet away on the same bench, I could feel the qualities of their conversation—smooth, paced, not urgent. If everyone had been isolated in individual chairs, this information would have been lost in transit. Benches have vibratory qualities that link multiple parties to one another. They can also be covered in materials like synthetic leather, which store thermal traces and can be useful in determining not only where people are, but where they have recently been. For protactile people, this appears as a positive affordance.

Architecture, Infrastructure, and Participation

If floors can take an active role in interaction, how might our theories of interaction be revised, and what implications would this have for our understanding of how languages emerge, develop, and persist? Goffman argues that the "situation" within which communication occurs, "mark[s], as it were, the geometric intersection of actors making talk" (63). These geometric intersections (we could think of them as

channels) link the sensory capacities of one person to another to yield “an environment of mutual monitoring possibilities, anywhere within which an individual will find himself accessible to the naked senses of all others who are ‘present’, and similarly find them accessible to him” (63). The situation is the most fundamental requirement for an interaction to transpire. Deaf Space and protactile design complicate this idea, since the sensory channels themselves, which link interactants, anticipate their interactions and are reflexively designed to support and amplify those connections. The material environment—*by design*—plays an active and culturally informed role in enabling and facilitating the encounter.

For re-channeling language, this is relevant insofar as signers draw on more general patterns of sensory orientation in constructing new grammatical patterns (Kokab et al. 2015). If this is the case, then infrastructure surely plays a role in shaping, reinforcing, and responding to those patterns. In prior research, I have shown how new articulatory and perceptual affordances revealed themselves to DeafBlind people in Seattle when new participant frameworks and patterns in interaction began to emerge (Edwards 2014a, 2014b). This research suggests that additional pressures are exerted on those channels of transmission by larger infrastructural dynamics.

Conclusion: Re-Channeling Language

In this article, I have argued that re-channeling a language begins not with the affordances of particular channels of transmission, but with the complementarity of the language user qua organism and its environment—first residence in the world and then representations of it (Kockelman 2006). DeafBlind people at Gallaudet treated the material environment and modifications to it as capable of facilitating or inhibiting residence. Le Corbusier, a key thinker often cited by Deaf Space scholars, wrote in *New World of Space*: “Taking possession of space is the first gesture of living things, of men and animals, of plants and clouds, a fundamental manifestation of equilibrium and duration. The occupation of space is the first proof of existence” (cited in Hansel Bauman 2014:375). These ideas resonated with DeafBlind people at Gallaudet. For them, being in space and being anticipated by it was understood as simultaneously an existential and political endeavor, which formed the foundation on which language could be built.

As protactile people interpreted protactile principles and revised the rituals that constitute daily life in those terms, the contours of the environment shifted, revealing both negative and positive affordances. New kinds of buildings, transit systems, and cities became imaginable at the same time that new channels of transmission for linguistic signs did. The environment is built up around certain affordances and also reinforces and shapes how those affordances are perceived (Benjamin 2001; Bourdieu 1970; Gibson 1986; Hanks 1990; Lynch 1960; Panofsky 1973; Simmel 1972). Re-channeling language at Gallaudet was a matter of intervening in those loops and broadening the range of channels that lead from humans out into their environment, wherein linguistic and gestural signs, novel sensory experiences, and other valuable things are circulating. Building new pathways that link Union Market to the visitor’s center and the visitor’s center to the metro station was not taken to be all that different from building new pathways that link interactants or language users to one another. This yielded an approach specific to Gallaudet’s protactile community for turning a visual language into a tactile one: First re-channel interaction, then re-channel the urban environment to support those interactions, and finally, as this foundation is materializing, notice how the channels of transmission fall in line.

Acknowledgments

This project would not have been possible without Robert T. Sirvage and Hansel Bauman. My thinking has changed course as a result of all they have taught me. I would also like to thank Liz Brading for bringing me into her fascinating world and

spending so much time with me as well as Jelica Nuccio, aj granda, Oscar Chacon, John Lee Clark, Yashaira Romilus, Eddie Martinez, Sarah McMillen, Paul Dudis, Darla Konkel, Samantha Fox, Vince Nuccio, and the participants of the Tactile Mind Collaborative for contributing to this work in crucial ways. For comments on this essay or ideas contained therein, many thanks to Paul Kockelman, Mara Green, Mark Sicoli, Annelies Kusters, Kamala Russel, Greg Edwards, two anonymous reviewers, participants of the Fyssen Colloquium on Translation, Interaction and Context, and especially, Bill Hanks. Funding to conduct this research was provided by the Wenner-Gren Foundation for Anthropological Research (Grant #9146) and the Office of Research Support and International Affairs at Gallaudet.

Notes

1. The analysis draws on one year of ethnographic fieldwork at Gallaudet in 2016 and 2017. During that time, I attended relevant public events on campus, accompanied design teams on visits to construction sites, spent time talking to employees in the Office of Campus Design and Planning, and attended regular protactile events on and off campus. I also conducted 20 semi-formal ethnographic interviews with DeafBlind, Deaf, and hearing people who are either currently affiliated with Gallaudet or were previously, as well as hearing, sighted nonsigners who have been involved in development, design, and construction projects that concern Gallaudet. In addition to the data collected during the year in which I was actively conducting fieldwork on campus, I was a member of the faculty of the Department of Linguistics at Gallaudet from 2014–2017 and have been involved in Deaf and DeafBlind communities in Seattle, Washington; Austin, Texas; and Washington, DC, in a range of capacities for more than 20 years. I have conducted linguistic and anthropological research in the Seattle DeafBlind community for the past 12 years. The general knowledge I have acquired in these contexts also informs this research.

2. There are 7 protactile principles, which have been developed over the past decade by aj granda and Jelica Nuccio as they have taught protactile philosophy and practice to DeafBlind people across the country and abroad. A summary of these principles is available in Grand and Nuccio (2018).

3. I started thinking about the transition from visual to tactile language in terms of “re-channeling” as a result of conversations with Mark Sicoli, who had been writing about whistled speech as a register of language that is re-channeled under certain environmental conditions (e.g., large canyons, thick fog) (Sicoli 2016). The process I am describing is not exactly the same, since protactile linguistic patterns are not genres with limited functionality, but there are many productive comparisons between the two cases (see Sicoli 2016:427 for a discussion).

4. This has also been a longtime interest of John Lee Clark’s, a DeafBlind writer and community leader who does not live in DC, but has acted as an adviser to Gallaudet’s design team and other groups on campus, and has exerted influence in significant ways. For example, in his essay on “Metatactile knowledge” he writes: “As my little ode to metatactile knowledge attests, it extends to interactions with objects. I know, I know, objects are dead and have no feelings. But they still respond to tactile contact and actions. Their design and the materials with which they are made do draw people to handle them in certain ways. Indeed, product developers study this all the time” (johnleeclark.com/). The community where Clark lives has been interpreting and applying protactile principles for nearly a decade and although I have not yet had the opportunity to visit, it may very well be that some of the observations made here are in play there as well. In sum, this interest is not unique to protactile people at Gallaudet, but under the influence of Deaf Space, it has permeated the common sense and can be observed ethnographically with ease.

5. In prior work, I have argued that social and interactional changes have led DeafBlind people to use the so-called tactile channel in new ways, or, in the terms developed here, to perceive new affordances in that channel (Edwards 2014a, 2014b). In particular, protactile people make far greater use of the proprioceptive sense than they did prior to the protactile movement (Edwards 2014a, 2014b). In more recent work conducted in collaboration with Diane Brentari, I am investigating the effects of this change on the sublexical organization of the language. Based on the results of a recent pilot study, we are arguing (in a forthcoming article), that as American Sign Language has been adapted to protactile environments, the atomic units and combinatorial patterns used to create new signs have been replaced. What we

are seeing is no longer conventions for adapting ASL for tactile reception, but rather, systematic principles that govern what is and is not a well-formed sign for protactile people. In this emergent system, there is greater internal complexity in the tactile channel because the proprioceptive dimension makes internal relations and oppositions possible without relying on inference or memory. These changes are in turn affecting the semantics of the language. For example, my prior work has shown that the deictic system is being reconfigured by way of a process I call “deictic integration” (Edwards 2017). Preliminary investigation into the most recent effects of deictic integration suggests that protactile DeafBlind people in Seattle now have a four-term deictic system: two locatives (one for discrete locations and one for paths), and two demonstratives (one for foregrounded elements and one for backgrounded elements). The features that distinguish these terms from one another require no vision or hearing to perceive. This is possible because more than just “touch” is involved—signers are drawing on proprioception in new and systematic ways. These changes in the linguistic system itself are expected to influence further developments in the phonological, semantic, and syntactic systems of protactile language (see Edwards 2017). This is, in summary, some of the work my colleagues and I are currently doing to track re-channeling within the linguistic system. However, these grammatical systems have emerged as protactile DeafBlind people have shifted their orientation to their environment more generally. That is how new affordances presented themselves. Rather than focusing on the internal, linguistic changes, this article focuses on the role of infrastructure and the material environment in shifting orientations in ways that make these changes appear as possibilities to protactile people.

6. We could think of this as a concrete exploration of what Langacker (2008) talks about as the “substrate” of language. At the same time, we could think of language and interaction *as* infrastructure (e.g., Dourish and Bell 2007). Or, as I do here, we could use the notion of channels, and in particular Kockelman’s (2010) framing of them, to explore the mutual dependencies and mediations between language, interaction, and infrastructure.

7. Kockelman means the agent of semiosis, broadly construed, not a person using a signed language. But his choice of terms has the perhaps unintended but much appreciated effect of making “signer” rather than “speaker” the more general category. Because of this lucky turn of events, I see no need to specify which meaning I intend.

8. And of course, an anti-structuralism, poststructuralism, and neostructuralism are soon to follow (Kockelman 2017:58).

9. For Saussure, opposition is a more demanding relation of difference than simple cases of nonidentity, or cases of contrast, where two things co-occur in the same frame, but are not the same. For an opposition to be linguistically relevant, it has to be possible to show that within a given syntagmatic sequence, the two opposed elements are mutually exclusive in a certain position. In other words, you have to select one or the other given a certain sequence (“selection in absentia”) (Saussure 1972 [1915]:124). Is “I” vs. “you” in the pronominal system of English comparable to visual vs. tactile modalities, or is the former organized by a more demanding relation of difference than the latter? What is the difference between contrast within a conceptual frame, and paradigmatic relations in *langue*? A continuum linking these degrees of differentiation is implied in Kockelman and without that, it would be difficult to account for the mutual influence exerted by channels that link signers and interpreters in interaction and those that link language-producers and language-perceivers.

10. Gibson (1986:127) said, “the verb to *afford* is found in the dictionary, the noun *affordance* is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment.”

11. The nature of the perception-action-environment relation in affordance theory is debated (e.g., Chemero 2003; Greeno 1994; Stroffregen 2003; Turvey 1992; Wells 2002; Withagen and Chemero 2011).

12. I recognize that this is a species-level analysis and I am exploring a phenomenon that does not apply to the entire species. I am drawing on this work to highlight the fact that when viewed through a different body, the world rearranges itself, and the particular way in which a world is arranged is part of what constitutes a particular form of life.

13. This is also one of the reasons why there are no places of articulation in visual signed languages on the back of the addressee, despite the fact that it would be physically possible (see Edwards 2014a). People don’t do that because they haven’t done it in the past.

14. There is an economy to this. Uexküll (2010 [1934]:101) observes that the “unfamiliar path” tends to have a repelling effect. In the case of fish, if you lower a partition into the aquarium and drag some food around it so the fish follows, and give him the food on the other

side, he will become accustomed to following that path. Then if you move the partition so the fish can go straight to the food, rather than going all the way around, he won't do it. Instead, he will follow the familiar path. As Uexküll (2010[1934]:102) says, "[t]he familiar path works like a streak of a more fluid medium in a more viscous one."

15. It may seem problematic that I am comparing DeafBlind people to animals, particularly because people who use signed languages have been compared to animals (e.g., nonhuman primates) and these comparisons have been used to demote both signed languages and Deaf people. However, first note that I am treating *all humans* as animals in the framework I am developing. Second, among the protactile people I know, it is common for DeafBlind people to talk about themselves as animals, for precisely the reason I do it here: to conjure possibilities for how they might be integrated with their environment in ways that are currently prevented by architecture, infrastructure, and design more generally. One could also point out that comparing humans to animals in order to degrade them suggests that one is not taking the lives of animals very seriously. Both moles and worms have many attributes that architects, planners, and designers can, and as it turns out, do learn from. In a recent poem titled, "Treasure" by John Lee Clark, a mythical origin story is created wherein all DeafBlind people used to be a ball of worms. Without the line breaks, here is the poem: "Our treasure is to be together. We used to be filthy rich. We had it as good as a ball of worms. We squirmed happily together in caves. We had it so good. We had our old curved nails tearing into pomelos. It was almost too much. One day a cluster wandered off and found something in the forest. It was too much. It splintered their souls into a million toothpicks. Some of them tried to come back. They stabbed us. They tried again and again until it was too many toothpicks to hold together against. We have never forgotten. Every time we snuggle against a wall we feel it. Every time we dig into a pomelo we feel it. Every time we wrap our legs around each other to talk we feel it. Our lost wealth. We want it back. We want it all back. The best way to get rid of a million toothpicks is by fire." According to the DeafBlind author of the poem, DeafBlind people are compared to worms because worms are seen as having desirable, tactile characteristics (personal communication, May 11, 2018). The idea is that there is something to learn from worms--something to envy about their lives. I invoke animals in this article in ways that are entirely consistent with this perspective.

16. Pseudonyms are used to protect the identity of people I interviewed and who were involved in my ethnographic fieldwork.

17. See Friedner and Osborne (2012) on some of the work that access discourses do coming from people who are arguing for improved access.

18. This vision was articulated in an unpublished essay and cited here with permission.

19. This perspective was influenced by the widely circulating and influential "Deaf Gain" discourse. See Dirksen Bauman and Joseph Murray's 2007 edited volume on Deaf Gain, and in particular their coauthored introduction.

20. While linguists do not generally view signed languages like American Sign Language as endangered languages, members of Deaf communities, particularly those who have been subjected to oral education, feel that their language is endangered in the sense that it is under attack by the biomedical and educational establishments (see Bauman and Murray 2007 and Baynton 1996 among others on this topic). In 1913, George Veditz, the Deaf president of the National Association of the Deaf, addressed his constituency in American Sign Language in a film that still circulates today. The name of the film was "The Preservation of the Sign Language." In it, he says: "A new race of pharaohs that knew not Joseph is taking over the land and many of our American schools. They do not understand signs for they cannot sign. They proclaim that signs are worthless and of no help to the deaf. Enemies of the sign language, they are enemies of the true welfare of the deaf. We must use our films to pass on the beauty of the signs we have now. As long as we have deaf people on earth, we will have signs. And as long as we have our films, we can preserve signs in their old purity. It is my hope that we will all love and guard our beautiful sign language as the noblest gift God has given to Deaf people" (translated by Dr. Carol Padden). The preservation and continued transmission of ASL remains a highly relevant concern in Deaf communities and at Gallaudet. Deaf Space design is one among many attempts to address the issue.

21. I mean "identity" here in the way that DeafBlind people at Gallaudet used the term. In American Sign Language, there is a sign—"Identity," which is initialized, meaning that the handshape of the dominant hand is an "I," suggesting a relationship between the ASL sign and the English word. Students at Gallaudet, would move the "I" from an upside down to a right-side-up position relative to the nondominant hand, making identity a verb, and they would say that a person either had or had not "I-turned-up," or "developed a DeafBlind identity." This

sign was applied by DeafBlind signers in situations where a person (a) did not go to DeafBlind events on campus or elsewhere in Washington, DC, despite being deaf and blind; (b) fell repeatedly, but did not want to use a cane; (c) did not communicate easily in visual contexts, but refrained from tactile communication and from requesting interpreters; (d) was able to see enough to “pass” as sighted and chose not to participate in the DeafBlind community. Gallaudet is a Deaf center, not a DeafBlind center. In a very general sense—people who go to Gallaudet either accept that they are Deaf, want to develop a Deaf identity, or are interested in being a part of that world as an outsider. Something similar is true for Seattle with respect to DeafBlind identity (also in a very general sense). People who move there (at least at this point in the history of the community) have generally already accepted that they are DeafBlind or they move there because they want to develop a DeafBlind identity. This doesn’t necessarily hold true at Gallaudet, and I found that DeafBlind identity (or its absence) was foregrounded more often at Gallaudet than it was in Seattle, perhaps because it could not be taken for granted.

22. See McMillen (2015) for a more in-depth discussion of many of these efforts—not only now but in Gallaudet’s history.

23. For Gibson, perceptions of the environment intertwine in reciprocal ways. For example, “[w]hat the male affords the female is reciprocal to what the female affords the male; what the infant affords the mother is reciprocal to what the mother affords the infant; what the prey affords the predator goes along with what the predator affords the prey; what the buyer affords the seller cannot be separated from what the seller affords the buyer, and so on” (Gibson 1986:135). While Gibson’s notion of affordances is largely applicable to the individual at the species level in evolutionary time, this reciprocity suggests the integration of others into the environment. Other people are part of the environment, and as such, they present certain affordances in relation to what we can do with them. For protactile people in DC, navigation in the city was something that was often done with others. Arms linked in arms, canes extended, we were visible and could sense each other’s movement in ways that helped coordinate the actions of the group. This helped us move confidently through spaces that might otherwise have felt dangerous to traverse. Once we discovered this, we were more likely to perceive navigation affordances in other people: the walker affords the walker, and more walkers affords the spider (even better).

24. See also Betcher (2009) and Kraus (2018) on the related process of Deaf conversion. And see Edwards (2014b) for a description of shifting practices, sensibilities, and modes of attention associated with the conversion from a Deaf, sighted social role to a DeafBlind social role.

25. This argument was put forth in a publically available TED Talk in American Sign Language, which was later translated into English by the author of this article.

26. This way of thinking about buildings has led Ben Bahan and Dirksen Bauman to conceive of architecture as “the third person” in the interaction: “Just as the ‘third person’ in the group focuses on the path forward and its possible hazards while others focus more intently on the conversation, buildings can *care* for their occupants by providing environmental cues that enhance spatial awareness, safety, and ambient conditions that promote well-being” (italics in the original, described/cited in Hansel Bauman 2014:388–389).

27. Levinson says that humans didn’t “evolve language and then get involved in a special kind of social life, it was just the reverse. For language must have evolved *for* something for which there was already a need—that is for communication in interaction” (Levinson 2006:42). He argues for a set of cognitive abilities and behavioral dispositions universal to all humans, which gives face-to-face interaction its special qualities (Levinson 2006:44–54). Perhaps added to these could be the tendency to apprehend the material environment in terms of its capacity to amplify, dampen, or transmit interactional cues. This would broaden the scope to include not only face-to-face interaction, but also the interaction of people in and with urban landscapes and the technologies that pervade them.

References

- Bahan, B. (2009). “Sensory Orientation.” *Deaf Studies Digital Journal* 1.
- Bauman, H. (2014). DeafSpace: An Architecture Toward a More Livable and Sustainable World. In *Deaf Gain: raising the stakes of human diversity*. H. D. L. Bauman and J. J. Murray. Minneapolis, University of Minnesota Press.
- Bauman, H. D. L. and J. J. Murray. (2014). Deaf Gain: An Introduction. In *Deaf Gain: Raising the stakes for human diversity*. H. D. L. Bauman and J. J. Murray. Minneapolis: University of Minnesota Press.

- Baynton, D. (1996). *Forbidden Signs: American culture and the campaign against sign language*. Chicago: University of Chicago Press.
- Bechter, F. D. (2009). *Of Deaf Lives: Convert Culture and the Dialogic of ASL Storytelling*. PhD dissertation, Department of Anthropology, The University of Chicago, Chicago.
- Benjamin, W. (1999). *The Arcades Project*. Cambridge, MA: Harvard University Press.
- Bourdieu, P. (1970). "The Berber House or the World Reversed." *Social Science Information* 9(2): 151–170.
- . (1972). *Outline of a Theory of Practice*. Cambridge: Cambridge University Press.
- Brentari, D. (2011). Sign Language Phonology. In *The Handbook of Phonological Theory*. Edited by J. Goldsmith, J. Riggle and A. C. L. Yu. Malden, MA: Blackwell.
- Chemero, A. (2003). "An Outline of a Theory of Affordances." *Ecological Psychology* 15(2): 181–195.
- Clark, J. L. (2014). *Pro-Tactile: Bursting the Bubble. Where I Stand: On the Signing Community and My DeafBlind Experience*. Minneapolis: Handtype Press.
- . (2017). Distantism. <https://johnleeclark.tumblr.com/>.
- Dourish, P., and G. Bell. (2007). "The Infrastructure of Experience and the Experience of Infrastructure: meaning and structure in everyday encounters with space." *Environment and Planning B: Planning and Design* 34: 414–430.
- Edwards, T. (2017). "Sign Creation in the Seattle DeafBlind Community: A Triumphant Story about the Regeneration of Obviousness." *Gesture* 16(2): 307–332.
- . (2014a). "From Compensation to Integration: Effects of the Pro-Tactile movement on the sub-lexical structure of Tactile American Sign Language." *Journal of Pragmatics* 69.
- . (2014b). Language Emergence in the Seattle DeafBlind Community. PhD dissertation, Department of Anthropology, Berkeley, University of California.
- Friedner, M., and J. Osbourne. (2012). "Audit Bodies: Embodied Participation, Disability Universalism, and Accessibility in India." *Antipode* 45(1): 43–60.
- Gibson, J. G. (1986 [1977]). "The Theory of Affordances." In *Perceiving, acting, and knowing: Toward an ecological psychology*. Edited by R. Shaw and J. Bransford, 127–143. Hoboken, NJ: Wiley.
- Goodwin, C. (2006). "Human Sociality as Mutual Orientation in a Rich Interactive Environment: Multimodal Utterances and Pointing in Aphasia." In *Roots of Human Sociality*. Edited by N. Enfield and S. C. Levinson, 96–125. London: Berg Press.
- . (2007). "Environmentally Coupled Gestures." In *Gesture and the Dynamic Dimensions of Language*. Edited by S. Duncan, J. Cassell and E. Levy. Amsterdam: John Benjamins.
- granda, a.j., and J. Nuccio. (2018). *Protactile Principles*. Seattle, WA: Tactile Communications. (<https://www.tactilecommunications.org/ProTactilePrinciples>)
- Green, M. E. (2014). The Nature of Signs: Nepal's Deaf Society, Local Sign, and the Production of Communicative Sociality. PhD dissertation, University of California, Berkeley.
- Greeno, J. G. (1994). "Gibson's Affordances." *Psychological Review* 101(2): 336–342.
- Hales, L. (2013). Clear Line of Sight. *Metropolis Magazine*.
- Hall, E. T. (1969). *The Hidden Dimension*. New York: Anchor.
- Hanks, W. F. (1990). *Referential Practice: language and lived space among the Maya*. Chicago: University of Chicago Press.
- Ingold, T. (2009). *Point, Line and Counterpoint: From Environment to Fluid Space. Neurobiology of "Umwelt."* Research and Perspectives in Neurosciences. Berlin: Heidelberg: Springer.
- Jakobson, R. (1960). "Closing Statements: Linguistics and Poetics." In *Style in Language*. Edited by T. A. Sebeok. Cambridge, MA: MIT Press.
- Keating, E., and G. Mirus. (2012). "Road Trips: Mobility and Sign Language Innovations." *Semiotica* 191.
- Klima, E. S., and U. Bellugi. (1979). *The Signs of Language*. London: Harvard University Press.
- Kocab A., J. Peyers, and A. Senghas. 2015). "Referential Shift in Nicaraguan Sign Language: a transition from lexical to spatial devices." *Frontiers in Psychology* 5: 1540.
- Kockelman, P. (2006). "Residence in the world: Affordances, instruments, actions, roles, and identities." *Semiotica* 162(1/4): 19–71.
- . (2010). "Enemies, Parasites, and Noise: How to take up residence in a system without becoming a term in it." *Journal of Linguistic Anthropology* 20(2): 406–421.
- . (2017). *The Art of Interpretation in the Age of Computation*. New York: Oxford University Press.
- Kraus, K. (2018). Deaf New Signers at Gallaudet: A Practice Framework for Conversions of Embodiment. MA Thesis, Department of ASL and Deaf Studies, Gallaudet University, Washington, DC.

- Langacker, R. W. (2008). *Cognitive Grammar: a basic introduction*. Oxford: Oxford University Press.
- Larkin, B. (2013). "The Politics and Poetics of Infrastructure." *Annual Review of Anthropology* 42: 327–343.
- Levinson, S. C., and J. Holler. (2014). "The Origin of Human Multi-Modal Communication." *Philosophical Transactions B* 369 (1651).
- Le Corbusier. (1948). *New World of Space*. New York: Reynal & Hitchcock.
- Lynch, K. (1960). *The Image of the City*. Cambridge: Cambridge University Press.
- Malzkuhn, M. (2007). *Home Customization: Understanding Deaf Ways of Being*. Washington, DC: Gallaudet University.
- McMillen, S. K. (2015). *Is Protactile Habitable at Gallaudet University: What does it take?* ASL/Deaf Studies. Washington, DC: Gallaudet University.
- Meier, R. P. (2002). "Why Different, Why the Same? Explaining Effects and non-effects of Modality Upon Linguistic Structure in Sign and Speech." In *Modality and Structure in Signed and Spoken Languages*. Edited by R. P. Meier, K. Cormier and D. Quinto-Pozos. Cambridge: Cambridge University Press.
- Panofsky, E. (1973). *Gothic Architecture and Scholasticism: An inquiry into the analogy of the arts, philosophy, and religion in the Middle Ages*. New York: Meridian.
- Perniss, P. A. Özyürek, and G. Morgan, et al. (2015). "The Influence of the Visual Modality on Language Structure and Conventionalization: Insights from Sign Language and Gesture." *Topics in Cognitive Science* 7: 2–11.
- Quinto-Pozos, D. and F. Parrill. (2015). "Signers and Co-speech Gesturers Adopt Similar Strategies for Portraying Viewpoint in Narratives." *Topics in Cognitive Science* 7: 12–35.
- Sandler, W. (2013). "Vive la différence: Sign language and spoken language in language evolution." *Language and Cognition* 5(2–3): 189–203.
- Sangalang, J. (2012). *Privacy in DeafSpace*. Deaf Studies, Gallaudet University.
- Saussure, F. d. (1972 [1915]). *Course in General Linguistics*. New York: McGraw Hill.
- Serres, M. (2007 [1980]). *The Parasite*. Minneapolis: University of Minnesota Press.
- Sicoli, M. (2016). "Repair Organization in Chinotec Whistled Speech." *Language* 92(2): 411–432.
- Sirvage, R. T. (2012). "Navigational Proxemics of Walking Signers: A paradigm shift in methodology." *Deaf Studies Digital Journal* 3.
- . (2015). "Measuring the Immeasurable: The Legacy of Atomization and Dorsality as a Pathway in Making Deaf Epistemology Quantifiable—An Insight from DeafSpace." TEDxGallaudet. Washington, DC: Gallaudet University.
- . (2017). *Access and Exposure in Deaf Space Design*.
- Star, S. L. (1999). "The Ethnography of Infrastructure." *American Behavioral Scientist* 43(3): 377–391.
- Stokoe, W. C. (2005 [1960]). "Sign Language Structure: an outline of the visual communication systems of the American Deaf." *Journal of Deaf Studies and Deaf Education* 10.
- Streeck, J., et al. (Eds.). (2011). *Embodied Interaction: Language and Body in the Material World*. Cambridge: Cambridge University Press.
- Stroffregen (2003). "Affordances as Properties of the Animal-Environment System." *Ecological Psychology* 15(2): 115–134.
- Tulburt, E., and M. Goodwin. (2011). *Choreographies of Attention: multimodality in a routine family activity*. In J. Streeck, C. Goodwin, and C. LeBaron (eds.), *Embodied Interaction: Language and Body in the Material World*, pp. 79–92. New York: Cambridge University Press.
- Turvey, M. (1992). "Affordances and Prospective Control: An Outline of the Ontology." *Ecological Psychology* 4(3): 173–187.
- Uexküll, J. v. (1957). *A Stroll through the Worlds of Animals and Men: A Picture Book of Invisible Worlds*. In *Instinctive Behavior: The Development of a Modern Concept*. Edited by C. H. Schiller. Oxford: International University Press.
- Wells, A. J. (2002). "Gibson's Affordances and Turing's Theory of Computation." *Ecological Psychology* 14(3): 140–180.
- Withagen, R., and A. Chemero. (2011). "Affordances and Classification: On the significance of a sidebar in James Gibson's last book." *Philosophical Psychology* 25(4): 1–17.