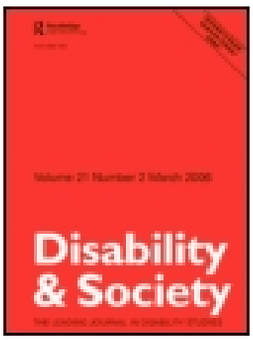

Disability & Society

ISSN: 0968-7599 (Print) 1360-0508 (Online) Journal homepage: http://www.tandfonline.com/loi/cdso20

The personal is political in The Deaf Mute Howls: deaf epistemology seeks disability justice

Octavian E. Robinson & Jonathan Henner

To cite this article: Octavian E. Robinson & Jonathan Henner (2017): The personal is political in The Deaf Mute Howls: deaf epistemology seeks disability justice, Disability & Society, DOI: 10.1080/09687599.2017.1313723

To link to this article: http://dx.doi.org/10.1080/09687599.2017.1313723

Published online: 24 Apr 2017.

DISABILITY & SOCIETY, 2017
http://dx.doi.org/10.1080/09687599.2017.1313723

Routledge
Taylor & Francis Group

The personal is political in *The Deaf Mute Howls*: deaf epistemology seeks disability justice

Octavian E. Robinson[a] and Jonathan Henner[b]

[a]Department of Modern Languages and Literatures, College of the Holy Cross, Worcester, MA, USA; [b]Department of Specialized Education Services, University of North Carolina at Greensboro, Greensboro, NC, USA

ABSTRACT

This article builds on Carol Padden and Tom Humphries' assertion that culturally identified deaf people inhabit a different center of knowledge than the non-deaf. Over generations of inhabiting a different center, deaf people have developed and transmitted embodied knowledge. The core of this knowledge is the role of sign language in developing language, cognition, and social structures. Modern fields of science search for truth by deconstructing false narratives. That is, anything worth being scientific is worth testing. While this approach may be effective for science, it devalues community knowledge since core tenets have no value until they are tested. To illustrate this, we critique a literary work, *The Deaf Mute Howls*, by deaf writer Albert Ballin in 1930. His work is particularly compelling because he suggests a radical approach to disability justice. Many of his claims were later verified by science, which presents questions about future research praxis centering deaf epistemology.

ARTICLE HISTORY
Received 31 August 2016
Accepted 28 March 2017

KEYWORDS
Disability justice; accessibility; inclusion; language deprivation; deaf studies; deaf epistemology

Points of interest

- Science ignores the knowledge and experiences of deaf people in research about sign language.
- Deaf people have for a long time shared knowledge about language and how it develops our cognitive skills.
- This article looks at a book by a deaf writer, Albert Ballin, to discuss deaf people's knowledge about language and cognition.
- Ballin suggests approaches to justice for disabled people rooted in the principles of disability justice.

CONTACT Octavian E. Robinson orobinso@holycross.edu

- Deaf people's knowledge and perspectives have much to offer to science researchers and their practices.
- Embracing deaf people's knowledge can help science and educational researchers gain new understandings about language and the brain.

In 1779, deaf Frenchman Pierre Desloges criticized a book published by Abbe DesChamps, a non-deaf educator who rejected sign language as an instructional medium for deaf children. The critique was 'A Deaf Person's Observations About An Elementary Course of Education For The Deaf' (Desloges 2006) in defense of sign language-based pedagogical methods. In his book, Desloges argued that sign language promotes cognitive and social development in deaf children. 'A Deaf Person's Observations' is the first known deaf perspective on deaf education and sign language. Desloges' claims regarding language as the scaffold for deaf epistemology, a sentiment shared by many deaf people over the subsequent centuries, turned out to be accurate when evidenced by data-driven scientific research in the latter part of the twentieth and early twenty-first centuries (Desloges 2006). While scientific methodology has improved in the 237 years since Desloges, what might have been gained in deaf and hearing-related research from paying attention to deaf epistemology and centering deaf people as subjects and researchers? How might non-deaf researchers and society in general have benefited from centering deaf cultural communities and methodologies rooted in deaf epistemology? These questions, addressed in this article, build on Padden and Humphries' (1988, 41) assertion that culturally-identified deaf people inhabit a different center of knowledge and experiences than non-deaf people. Through shared experiences, deaf people have developed and transmitted embodied knowledge (Rosen 2008, 137). The core of this knowledge is the role of sign language in developing language, cognition, and social structures. Community knowledge and modern science are often seen as antagonistic. The modern fields of science search for truth by deconstructing false narratives (Popper 2005, 9). That is, anything worth being scientific is worth testing. While this approach may be effective for science, it devalues community knowledge because core tenets have no value until they are tested.

To illustrate this point, we critique the literary work *The Deaf Mute Howls* published by deaf artist and writer Albert Ballin in 1930 (Ballin 1998). A critical analysis of Ballin's fictional memoir from a psycholinguistics and disability studies perspective expands our understanding of deaf epistemology, illustrates its relation to the scientific body of knowledge, and suggests the potentiality of deaf epistemology in future research. Ballin's work is enthralling because he suggests a radical approach to accessibility and inclusion. He attempts to achieve disability justice by arguing for the value of signed language for everyone, including non-deaf people. Ballin's work sought to shift 'disability representation off from the body and into the interface between people with impairments and socially disabling conditions' (Hevey 1993, 426). It makes the distinction between disability and impairment, and also argues, familiarly, nothing about us without us. Ballin's desire for parity of

participation illustrates the point about achieving social justice by understanding that everyone is interdependent (Mladenov 2016). *The Deaf Mute Howls* is an example of early campaigning for disability rights and social justice activism. Beyond disability rights and the debates surrounding deaf education, the text highlights the value of deaf epistemology. Deaf Studies scholar Paddy Ladd describes this as 'deaf ways of being in the world, of conceiving that world and their own place within it, both in actuality and in potentiality' (Holcomb 2010, 472). Deaf people, including deaf children, are possessors of valuable community knowledge.

A close reading of Ballin raises questions about the ways science has dismissed deaf people's embodied knowledge. Science has also long been dismissive of other marginalized people's situated knowledges:

> Feminist epistemology and feminist criticism of science focus on changing the background social conditions in which science is practiced. It is therefore an explicitly political enterprise, but one that is justified by epistemic values, such as reason and empirical adequacy, to which science already declares its allegiance. (Anderson 1995, 56)

By extension, deaf epistemology joins feminist epistemology in urging a shift away from existing power structures in the production of scientific knowledge. Deaf epistemology, then, is the cumulative effort of deaf people who have joined the epistemologies of women, disabled people, and other peoples of marginalized social identities, in challenging 'truth regimes that serve to fortify dominant orders and oppress marginalized groups' (Ray 2013, n.p.). The prescience of Ballin's text, and thus deaf epistemologies, compels a reconsideration of scientific praxis. Embracing deaf epistemology means the inclusion of deaf people in research and policy-making, acknowledging deaf people's epistemic authority, producing theories treating deafness as a gain rather than as an impairment, rendering deaf gain and deaf people's participation in society visible, and producing knowledge that benefits deaf people. Deaf epistemology provides the opportunity to generate new questions, theories, and methods in scientific and academic inquiry while contributing to emancipatory movements for deaf people. The benefits of deaf epistemology are not limited to deaf people; it lends itself to the joint knowledge of other marginalized groups such as women and other disabled groups.

Understanding how disability and language situates knowers allows us to evaluate and reform structures of epistemic authority. For deaf people, access to language translates into access to power and status. This is salient in academic disciplines where deaf people's epistemic authority has long been denied. Ballin's key point is that restricted access to language harms deaf people and non-deaf people alike. Language access also affirms belonging in society by reducing language-based barriers (Ladd 1988). With language, particularly sign language, deaf people and their knowledge contribute to society in meaningful ways.

Ballin's *The Deaf Mute Howls* is a narrative of embodied knowledge created in the crucible of ableism, audism, and phonocentrism in resistance to oral education. Oral education attempts to assimilate deaf children into the non-deaf majority through prohibitions on sign language-based education practices

(Valente 2011, 643). Joseph Valente, an educational philosopher and advocate, writes that oral approaches focus on speech development, lip-reading, and aural comprehension practices (i.e. hearing better) often at the expense of other skills. Oral education and much of deaf people's educational history was rooted in American social thought policies, which did not include deaf people in their genesis. The modernist episteme particularly had repercussions for deaf education because leading American thinkers framed deaf people as outside the mainstream who needed to be brought into the fold (Rosen 2008, 133–134). In the face of the modernist episteme, Ballin, along with many other deaf people of the time, resisted the movement by staunchly presenting their own knowledge and experiences.

A reading of Ballin and of the larger canon of deaf epistemology obliges us to question the value we place on and the consequences of ignoring corporeal epistemologies from marginalized groups. This also helps us consider further avenues in modern scientific research, and examine research and educational praxis in deaf and non-deaf contexts. As Ballin's text illustrates, along with other published instances of deaf epistemology surrounding language and education, there is indeed value in the wisdom gained from corporeal knowledge. However, the privileging of scientific knowledge produced by non-deaf people, coupled with emphasis on sound-based languages (phonocentrism, or what Valente [2011, 643] calls phonocentric colonialism) and ableism, allows myths and ignorance to persist despite two centuries of publications by deaf people advocating sign language pedagogical methods for deaf children. Ignorance about language, cognition, and acquisition of literacy posits a significant harm to deaf people while depriving society of the benefits of neuro-diversity and bio-diversity of ability and disability. Deaf Studies scholars Bauman and Murray (2014) propose the premise of deaf gain in which deaf people contribute to society in significant ways. The neglect of deaf epistemology is an act of impairment and strips our society of deaf gain.

The ongoing denial of deaf epistemology contributes to attitudinal, employment, and educational barriers for deaf people. This social dynamic of power in interaction with bodily impairment leads disabled people to make claims upon the state for disability justice (Soldatic 2013, 748). Schools, as agents of the state, bear responsibility for disabling deaf children through language deprivation. Ballin behooves his readers to hold the state accountable for disabling deaf children through educational malpractice by embracing solutions via deaf epistemology. The epidemic of language deprivation is perhaps the most significant consequence of ignoring deaf epistemology. Language deprivation robs deaf people of the ability to communicate effectively, think clearly, regulate their emotions and impulses, and be fully participating political citizens. Thus the persistence of oralism, rebranded in the twenty-first century as listening and speaking language or auditory–verbal therapy, is an act of disabling deaf children in multiple ways. Advocates for oralism, determined to mold deaf children into their ideas of the

norm, have prompted deaf people to publish defenses of sign language and critiques of oralism since the eighteenth century in efforts to achieve disability justice. Frustratingly, oral advocates have framed themselves as the oppressed rather than the oppressors, and have espoused a view of manualism and sign language as the dominant cultural narrative (Mauldin 2016, 56–57).

Claims of language deprivation and decentering of deaf communal knowledge, situated in deaf epistemology, were written about in *The Deaf Mute Howls*, indicating little had changed since Desloges published his essay a century and half earlier. However, the experiences of the deaf have largely been neglected as non-deaf people debate the nature of language and create policies governing pedagogical practices for deaf children which ignore community best practices. A close reading of Ballin and incorporating a disability studies perspective in our work allows us to bridge the gap between the sciences and disability studies by paying attention to the actuality of deaf people's lives. Corporeal knowledge and science need not be mutually exclusive. Teacher educator Ye Wang (2010) suggests a metaparadigm where boundaries between lived experience and science are transcended; researchers using multiple paradigms that honor constructed knowledges have the potential to broaden our applications, praxis, and knowledge. Rather than a paradigm shift, we suggest that researchers expand their methodologies and praxis to be more cognizant of deaf epistemology.

By science in the context of this article, we refer to standard epistemology. Standard epistemology is findings that are supported through an objective systematic study. We critique both methodologies and practices in deaf-related research while arguing that research or knowledge about the body-mind need not be limited to what can be enumerated by science. Research praxis benefits from including deaf people's knowledge and lived experience, and deaf people themselves as researchers, in answering questions surrounding language and cognition. The accuracy of the claims in Ballin's text suggests deaf epistemology has great potential for use by non-deaf researchers. Most importantly, it reaffirms the value of listening to the community and experience-based knowledge of marginalized peoples without waiting for scientific falsifiability (for example, Popper 2005). After all, can we rely on empiricist science to 'serve as the neutral arbiter in laying this debate to rest once and for all. But is this tenable?' (Gallagher 2001, 638). Or should we make allowances for situated knowledge and ask is science truly neutral? How do researchers' ontologies and epistemologies affect their work? (Clerck 2010)'.

Deaf epistemology, the study of deaf people's knowledge and justified beliefs based on lived experience, offers all of us a distinctive opportunity to think about the nature of language. Deaf people, by the very nature of their difference, yield unique knowledge about alternative mechanisms for communication in a phonocentric world. For most, the idea that language is not restricted to phonocentric approaches is unnerving:

> If the world is designed to accommodate the normate's body-[mind] then non-normates are all the more attuned to the material world, as they spend much more energy navigating it … because the disabled body-[mind] remains attentive and responsive to changing environmental conditions, it exhibits a mature form of environmental sensitivity. (Ray 2013, n.p.)

If people cannot communicate through sound, they find alternative means. Deaf people have long argued that language exists in gesture, in sign language, through print, and even by tactile means.

The need to listen to deaf epistemology for alternative views on communication becomes more apparent as modern scientific technologies and methodologies attempt to restrict the natural diversity of humans and human languages. Where would sign language be if there were no deaf people? Would tactile language exist if there were no deaf-blind people? What will happen to our natural diversity when language becomes restricted to spoken and print modalities? Today, deaf people and their allies work to reaffirm the diverse nature of language, while validating their historical community claims.

Publications of claims about visual language and contributions to deaf epistemology emerged via deaf people's efforts to challenge dominant ideas about spoken language approaches in deaf education. They were also an attempt to defeat the efforts of non-deaf people to diminish and disparage the use of sign language. Defying the notion that only spoken languages are true languages, deaf epistemology suggests sign and tactile languages as equal to spoken languages for expressing abstract thought and contributing to cognitive development and social well-being.

A deaf epistemology offers avenues not only for improving the quality of deaf lives and deaf education but also to expand our understanding of human diversity. Its validation through recent findings in modern science builds on philosopher Edmund Burke's 1759 statement that the senses are the 'great originals of all our ideas' (Burke 2001). The collaboration of deaf epistemology by science suggests there are many ways of understanding the world that is not limited to science and embodied knowledge has much to offer. Anthropologist Goedele DeClerck suggests:

> conceptualizing and continuing this discussion from an epistemic stance involves raising questions such as these: *Is there a deaf way of viewing the world? What is the status of (indigenous) deaf knowledge(s)* versus *science? How can deaf knowers be conceptualized in science? In what context are science and knowledge produced, and what is the value of science? How do deaf people construct their knowledge? Is it legitimate for deaf people to claim knowledge, and why?* (Clerck 2010, 435–436; original emphases)

Philosophers, researchers, educators of deaf children, and support professionals who work with deaf people, however, have largely neglected deaf epistemology (Moores 2010). The collective ignorance of deaf epistemology raises questions about values surrounding a-priori non-empirical knowledge regarding disabled peoples. Most importantly, it reveals prejudices about the ability of disabled people

to contribute to a corpus of knowledge about the human body and mind. Deaf people have, over the generations, sustained a corporeal epistemology, which is knowledge rooted in the deaf body-mind and its movements within the larger non-deaf world. Deaf epistemologies have been long neglected because able-bodied and able-minded people do not 'perceive disabled people as having equal intelligence, potential or capability' (Ray 2013, n.p.). The construct of disability positions disabled people as unable to contribute to the corpus of knowledge because of overarching beliefs that they are inherently less intelligent or capable: 'Indeed, the very definition of disability is the need for special accommodation to allow them to fulfill functions otherwise deemed normal' (Ray 2013, n.p.). Bauman (2008) suggests phonocentrism also contributes to the marginalization of deaf epistemology through the assertion that only spoken languages possess the capability of expressing abstract thought. Ballin challenges this paradigm in *The Deaf Mute Howls* by drawing attention to the centrality of language in the lives of deaf people and the urgency for deaf people to be included. As Ballin writes, 'this uproar has to be proportioned to the enormity of the wrong, we, the deaf suffer' (1998, 2).

American historian Douglas Baynton (1998) notes that Ballin's education coincided with the ascent of oralism following the American Civil War, which shaped Ballin's educational experience and worldview. Oralism reached its apex in 1920; by then 80% of deaf children were being educated using oral approaches rather than sign language, double the number at the turn of the nineteenth century (Baynton 1992, 218). Ballin published his fictional memoir in response to the popularity of oralism, narrating from the point of view of a typical deaf person, which was a composite of deaf people he had encountered throughout his life (1998, xii). After describing a host of cognitive, social, and economic challenges confronting deaf people, Ballin pinpoints the source of those challenges: language deprivation rooted in pedagogical methods for deaf children that excluded the use of sign language. Ballin laments the state's failure to properly educate deaf children: 'All these schools [for the deaf] are supposed to be giving a good education to all their pupils. But do they?' (1998, 6). Nearly a century after the publication of *The Deaf Mute Howls*, his question remains germane: do schools and programs for the deaf educate deaf children well? The question persists as the same challenges from the nineteenth century linger into the twenty-first century. As educational researcher Carol Erting (1992) lamented, 'Why can't Sam read?'

The answer to Ballin's (and Erting's) question about the best way to educate deaf children is sign language. Proposing a social construction of disability and a radical approach to disability justice, Ballin's solution to poor pedagogy in deaf education was to coeducate deaf children alongside non-deaf children using sign language in mainstream settings. Ballin's idea was innovative; he wanted to create mainstream educational environments that were inclusive of deaf students while making communication accessible by having all children use sign language in the classroom. In Ballin's perspective, non-deaf people benefited from having deaf

people around. He reasoned that non-deaf children could learn sign language without a detrimental effect on their print literacy or spoken language acquisition:

> Historical developments, social expectations, and physical environments all create conditions of disability. Disability is thus not located in the individual so much as it is located in the contingent relationship between the individual and social expectations of behavior and productivity. (Ray 2013, n.p.)

Ballin argued that if all children learned sign language and could communicate with deaf people, this would dissolve social, linguistic, and attitudinal barriers between deaf people and society's expectations of them. This radical argument suggested that access was the responsibility of society as a whole and required a collective effort to dismantle disability. We need to shift 'how we understand access, moving away from the individualized and independence-framed notions of access put forth by the disability rights movement and, instead, working to view access as collective and interdependent' (Mingus 2011). The dissolution of language barriers then eliminates disabling factors for deaf people who would have greater access to political citizenship and economic opportunities. Ballin predicted that if deaf children were mainstreamed with non-deaf children using oral pedagogies, language barriers would remain entrenched (1998, 46). Deaf children would have to work harder for less access to information. However, the modern perspective of mainstreaming differs from Ballin's interpretation, in which deaf children supposedly benefit from being around the non-deaf via integration practices. Unlike Ballin's suggestion, which would have dissolved barriers to access, the contemporary model has been characterized by Branson and Miller (1993, 22) as a form of systemic violence against deaf children by further isolating them; and forcing them to conform to non-deaf ways of communication and socialization.

Recent developments in contemporary scientific and linguistic research suggest that Ballin's lived knowledge was correct about language acquisition and cognitive development for deaf children. A little more than three decades after the publication of *The Deaf Mute Howls*, non-deaf linguists recognized American Sign Language and other national sign languages as true languages on a par with spoken languages (Bellugi, Poizner, and Klima 1989; Stokoe 1980). This recognition was followed by half a century of ongoing research on language acquisition and cognitive development in both deaf and non-deaf children.

Tension between deaf people's situated knowledge and clinical ideology persists after more nearly a century and half of concerted advocacy for bilingualism in deaf education. Despite those efforts, deaf people's situated knowledge such as that outlined in *The Deaf Mute Howls* has been granted little legitimacy. Deaf people's knowledge regarding language and education of deaf children has confronted resistance from scientists, linguists, educators, and mainstream society because deaf epistemology does not carry the weight of standard epistemology (Holcomb 2010). This resistance emerges in Ballin's preface, 'from certain quarters I expect some brick-bats to fly at my head' (1998, xxxviii). Ballin anticipated resistance from those who opposed sign language and those who wanted to keep deaf

schools in existence as loci for deaf cultural communities. In the United States since the mid-nineteenth century, educators, deaf and non-deaf people, legislators, and those with an interest in deaf education have become deeply entrenched in the debate over whether listening and spoken language approaches and sign language approaches are the best pedagogical models for deaf children (Baynton 1992; Edwards 2012). Nevertheless, then, as now, choices by non-deaf policymakers that do not center deaf epistemology or deaf communicative needs drive deaf education (Valente and Boldt 2016). As Valente and Boldt write, deaf people are disabled in environments where they cannot communicate effectively. Ballin, however, was confident that he was speaking what he called 'irrefutable truths' and held sincere hope for reform in deaf education (1998, xxxviii).

Ballin urges deaf people to maintain the uproar 'incessantly until the wrongs inflicted on him will have been righted and done away with forever' (1998, 1). This wrong Ballin speaks of is language deprivation. Language deprivation is a recent label given to a host of different cognitive, social, and behavioral challenges that arise from none-to-incomplete access to a natural language during formative years (Henner et al. 2016). This speaks to a critical problem confronting deaf and hard of hearing people as evidenced by contemporary underemployment and unemployment rates, struggles with achieving literacy in sign language, oral language and print, high school graduation rates, and higher education attrition (Garberoglio, Cawthon, and Bond 2016; Luckner and Handley 2008). The vast majority of deaf children are born to non-deaf parents who often do not know sign language, which makes it difficult to learn both language and culture through shared family knowledge (vertical transmission) (Mitchell and Karchmer 2005; Solomon 2012). While deaf children of deaf parents are more likely to get language and culture from their parents through vertical transmission, deaf children of non-deaf parents must acquire language in other methods. These methods range from teaching parents how to sign, to cued speech, to oral therapies. However, not all of these methods are effective ways to reduce the chance of language deprivation. Linguists Christian Rathmann and Gaurav Mathur (as quoted in Mellon et al. 2015, 172) argue that oral approaches are more likely to contribute to language deprivation because there is high variability in the success of cochlear implants and audio-verbal therapy approaches. Their arguments are echoed by other researchers, notably Lyness et al. (2013). Mauldin (2016) reminds us that successful implantation requires adherence to a strict schedule of therapy, doctors, and in-house facilitation of oral language, things that many families cannot afford. Even then, with all of those resources, not all children can make implants and oral approaches work for them. On the contrary, bilingual approaches guarantee language access (Mellon et al. 2015, 172).

Ballin's work suggests as much with his commentary on cognitive development through visual language. His memoir recounts how if his parents had known at least the manual alphabet when he was young, his mental faculties would have been developed and:

> kept active and alive during my early childhood … they neglected the development of the nerve centers that would make me capable of understanding a spoken or written language. These nerves deteriorated and became atrophied, from disuse, as would any other part of the body under a similar condition. Others have suffered this atrophy, and I believe it to be largely responsible for the infinity of woes that cling so tenaciously to the afflicted throughout his whole life … They will convince you of the absolute necessity of teaching deaf children how to read and write without delay. (Ballin 1998, 10)

The following links current research with five major points made by Ballin. First, parents did not need to be fluent in sign language for deaf children to benefit. Second, early exposure to language was critical to deaf children for language acquisition and social well-being. Third, language itself plays a critical role in cognitive development. Fourth, deaf children would devise a natural visual language somehow even without sign language input from adults. Finally, sign languages are indeed natural languages.

Ballin first argues that parents need not be fluent in sign language for deaf children to benefit from sign language use at home. While it is possible to become proficient in sign language without much parental contribution (see Singleton and Newport 2004), parents that refuse to learn sign language, or enough to hold a good conversation, risk alienating their deaf children. Parental reluctance to use sign language contributes to the development of psychological and cognitive disabilities in deaf children. The most well-known narrative of fractured parental–child relationships because of a lack of a shared language has been dubbed The Dinner Table Syndrome (Hauser et al. 2010). The Dinner Table Syndrome describes the experiences of deaf children and adults sitting around a dinner table with their non-deaf family members. Deaf children are expected to be active participants in conversations that they cannot understand. The exclusion of deaf children by creating intrafamilial barriers prevents deaf children from forming into whole people who can fully engage in society. One of the major arguments against bilingual–bicultural approaches to educating deaf children is that parents are unable or unwilling to achieve sufficient competency in sign language (Knoors and Marschark 2012). That learning sign language is 'hard,' 'time-consuming,' or 'expensive' continues to be one of the many canards pushed by non-deaf people as reasons for employing non-signing methods of deaf education and intervention (Scambler as quoted in Mellon et al. 2015, 172). This reluctance to learn sign language is symptomatic of the social dynamic of power that contributes to the disablement of deaf children.

The fact that non-deaf parents of deaf children refuse sign language, and therefore possibly deprive their deaf children of language, may not wholly be their fault. Doctors, audiologists, and speech language therapists that adhere to medical models of deafness believe that sign language interferes with speech acquisition (see Mauldin 2016). In the nineteenth century, oral education advocates argued against the use of sign language because deaf children would then refuse to learn (spoken) English (Ballin 1998, 43). Alternatively, doctors and researchers have argued that

sign language use before the age of three freezes the brain into a visual language modality wherein it is difficult to acquire spoken (or possibly print) English (Giraud and Lee 2007, 382). However, no existing scientific inquiry has provided any evidence that the so-called visual takeover hypothesis is, in fact, true. Throughout the fictional memoir, Ballin emphasizes time and time again that exposure to sign language does not impair acquisition of English; it is lack of language exposure that is responsible for language deficiencies:

> To you who have read closely it should now be obvious that it is not the sign language that is responsible for the poor English of the deaf-mute. His use of signs is no more to blame than is the pencil in your hand when you write. (Ballin 1998, 26)

Ballin's second point is that early exposure to language is critical to deaf children for language acquisition and social success. Ballin, in Chapter 5 'I Make Progress,' outlines the window for language acquisition, suggesting that the difference between a deaf-mute, a non-speaking deaf person, and a semi-mute, a deaf person who perhaps has residual hearing or can speak, is the age of becoming deaf. If one becomes deaf after six years old:

> his brain has attained a development that enables him to retain unimpaired memories of what he had heard and learned through his ears. He is much easier to teach, almost as easy as any normal child. (Ballin 1998, 19)

Ballin, in 1930, pegged the window of language acquisition to six years of age. By capitalizing upon this window of language acquisition, Ballin suggests that deaf children have better opportunities for not only access, but also inclusion. Modern scientists have shown that language acquisition does have maturational constraints (Newport 1988). Language acquisition was originally estimated to happen until about 12 years of age (Lenneberg 1967). However, 12 years of age seems to be the end of easy second (and more) language acquisition (Flege, Yeni-Komshian, and Liu 1999). The critical period for first language acquisition is much earlier (Mayberry 1993) and is roughly around Ballin's expectation of six years old. Ballin's theories of language maturational constrains were rather prescient. He suggests that those who try to learn a new language at a later age would have a very difficult time learning the language – and it was more difficult for deaf children who had no 'mother-tongue,' no early language building blocks for new language acquisition (Ballin 1998, 15).

Ballin illustrates the difference between deaf and non-deaf children in the following passage, suggesting the significance of incidental learning for language acquisition:

> To appreciate the stupendous difficulty confronting me you must compare my situation with yours at the same age. Words, phrases, sentences, whole paragraphs have been dinned into your ears since birth, and you have repeated them without any great effort. You knew the meaning of many words long before you were sent to a school. (1998, 14)

Incidental language learning occurs when children pick up language that is not directed at them (Hauser et al. 2010). For example, parents talking to each other

about their day. Language is not quite taught by parents as much as it is incidentally acquired from the environment. This incidental learning is critical for formal language instruction later in life. Ballin suggests incidental learning is critical for broader access to the world.

Non-deaf people often make the argument that sign language can be learned later than spoken language. In early 2016, Meredith Sugar, then president of the Alexander Graham Bell Association for the Deaf and Hard-of-Hearing, a non-deaf-run organization that supports oralism, argued that 'Moreover, the window for a deaf child to acquire listening and spoken language is much shorter than the window in which ASL can be acquired' (Sugar 2016). No current scientific evidence exists to support Sugar's perspective. Non-deaf supporters of oralism discredit sign language position as natural language when they suggest that sign language does not align to known maturational constraints on language acquisition.

The third point made by Ballin is that early access to signed language (or any language) is necessary to develop and maintain cognitive abilities and functions in deaf children. Ballin says as much about efforts to learn language as an older child: 'Nothing was really the matter with my brain, unless we except the referred to inexplicable atrophied centers connected with the acquirement of language' (1998, 18). Cognitive growth depends on access to all language, including signed language. While some scientists have suggested that there is a direct correlation between deafness and cognitive ability, psychologists, educators, and other researchers have argued that language deprivation has a cumulative effect on children's cognitive development, the development of physical brain matter, and dysfunctions in one's executive functions, which helps regulate behavior, emotions, and attentional systems, amongst others (Hauser, Lukomski, and Hillman 2008; Mayberry, Lock, and Kazmi 2002; Mayberry et al. 2011; Schick et al. 2007). There is growing evidence that language helps us understand abstract concepts, such as numbers (Coppola, Spaepen, and Goldin-Meadow 2013). Language also helps us develop the ability to find, formulate, and connect relationships between concepts, ideas, and things (Coppola and Henner n.d.; Henner 2016). Although much of the research on the link between language and cognition is relatively recent, Ballin's memoir suggests that deaf people have long been aware of this connection. Researchers, educators, and society at large should then turn more often and with more confidence to corporeal and community epistemologies.

Ballin also revealed the genetic impulse for language in children. Ballin argued that given no sign language input from the environment, deaf children would evolve their own gestural system: 'These children always invent their own signs in spite of all efforts at suppression' (1998, 26). The modern scientific analysis of invented languages by deaf people and their families, or homesign, began in the 1970s. Not only will deaf children invent their own systems, but they will do it separately from parental input (Goldin-Meadow and Mylander 1983). The mothers in their study learned gestures from their children, not the other way around. Even when family members of homesigners learn gestures, they do not understand

them very well (Carrigan and Coppola 2017). Although homesigners develop their own language, their systems have syntax (Coppola and Newport 2005). Homesigners also have a lexicon (Richie, Yang, and Coppola 2014), and use space linguistically, which is essential for visual languages (Carrigan, Coppola, and Tabor 2014). However, because gestural systems are not true languages, they cannot scaffold cognitive development (Coppola and Henner n.d.; Coppola, Spaepen, and Goldin-Meadow 2013; Spaepen et al. 2011). Most importantly, homesign gestural systems are an ecology of one. Homesigners invent their own systems. In all of the world, there is only a single person who speaks the language of each individual homesigner; the homesigner themselves.

Ballin noted that children learned language more from each other than their parents (1998, 22). If a community of homesigners can gather near and interact over time, a new sign language will appear. Scientists and language researchers were able to study the development of a new sign language in Nicaragua when homesigners were collected to form a new school for the deaf (Senghas, Senghas, and Pyers 2005). Over three generations (cohorts), homesigners could create a creole, a mixture of different homesign systems, and, finally, a consistently used new language – Nicaraguan Sign Language.

Deaf epistemology suggests that sign languages are bona-fide languages – and not only are they true languages, they are natural to the brain: 'In our talks, we the deaf-mutes, never communicate except by signs – only signs. It is to us the most natural, easiest and sweetest language' (Ballin 1998, 19). Throughout *The Deaf Mute Howls*, the author asserts that sign language is a natural language, not an artificial language, complete with meaning and capable of abstract thought. He is not the first to make such an assertion, but linguists did not deign to research signed languages as bona-fide languages until the 1960s. In 1960, William Stokoe, a non-deaf person who interacted with deaf people and worked with deaf researchers, proved to other non-deaf people that American Sign Language was a true language with a syntax and shared many features of spoken languages (Stokoe 2005). While there were counter arguments that languages which were not in the oral/aural modality violated some hidden law of language (for example, Landar 1961), over the next 20 years tireless work by many researchers, mostly non-deaf, and only some of whom centered deaf people, convinced the world that visual languages were, in fact, true languages (Petitto 2000; Poizner, Bellugi, and Klima 1990). Ballin speaks to the fact that deaf people have known for a long time that sign language is a true language, not just another channel for spoken languages. It has a system of phonology, syntax, and morphology. It has a lexicon. There are contact languages, creoles, and slang. Children move the language forward. Different groups of people have their own sign language depending on country, location, and culture:

> He [the signer] stands on the same footing as any foreigner who can talk fluently in his own tongue, but cannot speak one word of English. It is, therefore, absurd to condemn as stupid a deaf mute merely because he cannot talk in any tongue other than his own – the sign language. (Ballin 1998, 61–62)

In fact, Ballin suggests that deaf people are misdiagnosed as cognitively disabled because of a lack of understanding of sign languages and their role in cognitive development. This warrants further research in the relationship between cognitive disability and language deprivation. Command of spoken English does not translate into cognitive ability. Learning to speak and get by amongst non-deaf people does not necessarily mean one is educated or literate: 'At the age of seven my mind was a clean white blank so far as written, printed or spoken language went. But it did not necessarily follow that I was stupid or feeble-minded' (Ballin 1998, 10).

Signs do promote English print literacy, suggests Ballin in an off-the-cuff remark about putting the cart before the horse during a fictional exchange with Alexander Graham Bell in *The Deaf Mute Howls*. Bell argued with Ballin that deaf children learning sign language would encourage deaf people to refuse to use English. Ballin dismisses Bell as having mistaken ideas. He believed that sign language should come before English and in doing so would serve as the most efficient pathway to English (Ballin 1998, 43). An important aspect of natural languages is that they can be used to facilitate learning a second language (Cummins 1979, 1980, 1992). Jim Cummin's theory of linguistic interdependence is well known and supported in spoken languages (for example, Roessingh 2005). Huguet, Vila, and Llurda (2000) found that skills in Catalan scaffolded children's abilities to learn Spanish. Linguistic interdependence also explained the mathematical success of bilingual French Canadian grade students who were learning English as a second language (Bournot-Trites and Reeder 2001).

One of the more exciting avenues in current research is showing how sign language can be used to facilitate learning the print forms of spoken languages (Hoffmeister and Caldwell-Harris 2014; Petitto et al. 2016). While non-deaf researchers try to point out that sign language cannot connect to print because print requires phonological knowledge of spoken language (for example, Mayer and Wells 1996), Cummins himself writes that this line of thinking is limited (Cummins 2006, 5). Ballin highlights that mastery of English would follow naturally once the deaf child acquired the habit of thinking in words and had constant exposure to visual language (1998, 81). Ballin's thinking was very much in line with Cummins. We know that superior knowledge of sign language transfers to print English ability (Hoffmeister 2000; Novogrodsky et al. 2014; Wilbur 2000). More and more, researchers are finding that sign language use may actually facilitate spoken English development in deaf children; it certainly does not hinder the language development of non-deaf children of deaf adults (Davidson, Lillo-Martin, and Pichler 2014).

Ballin was not the first or the last to write about sign languages as bona-fide languages or their potentiality for cognition and language transfer. His work is unique because of how early claims were made about language's function as a building block for brain matter. His intuitive, community-based knowledge, developed through lived experience and observation of peers, is exceptional in laying out a pathway to understanding the relationship between language and cognition that emerged well before established linguists or scientists discovered this and

published results in the latter part of the twentieth century, and scientists continue to research these phenomena.

Critical questions about methodologies must be posed given the ideological bent in research on deaf education and sign language, which favors phonocentrism. We are obliged to interrogate how methodologies are chosen and how data are analyzed. We must review how those methods are influenced by researcher attitudes toward deaf epistemology or their relationships with the subjects as self/other regardless of the researcher's status as deaf or non-deaf (Broun and Heshusius 2004). Deaf epistemology, like the epistemologies of other subordinated groups, is disadvantaged by dominant knowledge practices that exclude deaf epistemology and deaf researchers. Ballin's text hints at the merits of using subaltern research methodology and particularly toward achieving disability justice (Ladd 2003). Subaltern research methodologies ensure that people from social groups who are traditionally excluded from dominant power structures are included in the research endeavor through interaction and engagement. Non-deaf researchers like Robert Hoffmeister who include deaf people in their work as subjects and as researchers engage in a form of deaf-centric emancipatory research methodology. Deaf epistemology, read through the lens of modern science, suggests the value of including deaf researchers and deaf-centric approaches to research. Most importantly, deaf epistemology gives voice to American deaf community leaders who exist outside the academic system, such as Helping Educate to Advance the Rights of the Deaf founder Talilia Lewis and National Association of the Deaf attorney Tawny Holmes. Deaf community leaders embody deaf epistemology.

Granting deaf researchers and advocates epistemic authority while centering deaf subjects presents the potential for generating new questions, theories, and methods. Beyond research praxis, deaf epistemology holds much value for educational praxis. While research has verified what deaf people already know, we should follow disability advocacy in the disability rights movement vein of nothing about us without us. Ballin argues against the absence of deaf people in guiding deaf educational practices, critiquing the board of directors of schools for the deaf as being composed entirely of non-deaf men whose professions grant them no expertise in deaf education:

> These institutions [schools for the deaf] are run by … hearing men, with whose election the deaf have absolutely nothing to do … they meet every once in a while to hear financial reports, pass resolutions, and adopt policies without inviting any deaf man to their councils to give the benefit of his experiences or views … if you … try to 'butt in,' … they will, as they have in the past, ignore you with cold, silent, proud contempt. To them we, the deaf, are only stupid dummies who don't know what's good for us. (Ballin 1998, 17)

Deaf education dominates the discourse surrounding sign language and deaf people while serving as the primary vehicle for language and cultural transmission. As a result, the classroom is a natural starting point for discourse surrounding deaf epistemology and contemporary research. Many schools and programs for the deaf are state run or state funded, which charges the state with the responsibility

of protecting the rights of deaf children. Government culpability in deaf education brings into question the systems in place to protect deaf 'children from discrimination and uphold their right to education' (Porter 2016, 998). As disability rights scholars and educators, we must examine what responsibilities the legal system and the state has in safeguarding children from state sanctioned impairment (2016, 1007–1008). Even developed nations such as the United States lag in protecting the rights of disabled children (2016, 998). The language deprivation crisis and the exclusion of deaf epistemology in pedagogical practices expose those inadequacies in developed nations.

What further discourses might we consider in this imparity in deaf education and language deprivation beyond the sign language debate? Educational praxis such as including deaf people in educational policy-making, administration of deaf education, teaching deaf children, and researching best pedagogical practices should be centered in deaf epistemology (Lang 2003, 18–19). 'By finding ways to circumvent the numerous barriers they have faced as learned individuals, deaf people lay claim to being more than pupils or victims of oppression, but contribute to the advancement of the field of deaf education as a science' (2003, 18). Deaf epistemology provides us the impetus to critically reexamine our educational and research praxis while reevaluating the role or lack thereof of deaf people in policy-making. A social justice framework 'should underpin education policy and practice to redress power inequities and social justices that affect disabled students' lives and educational trajectories' (Liasidou 2013, 299).

Ballin's text, by discussing cognitive development relevant to both deaf and non-deaf people, has revealed that deaf epistemology contributes to human knowledge on a larger scope. Most importantly, critically examining Ballin's text reflects key flaws in scientific falsifiability. Community knowledge has to wait until the scientific community – typically abled, white people – deems the knowledge important enough to test. Also, often the testing itself is done within an oppressive system. Considering deaf epistemology and involving deaf people in research about deaf people reminds us that deaf bodies possess an embodied knowledge that is of value to science and humanity. This also gives the knowledge that the deaf community has a chance to pass scientific barriers: 'To that "humanity of man" that loves best and serves most, and should know the Deaf-Mute's problems and what his knowledge can impart to world progress that we may all together lift humanity to a higher standard' (Ballin 1998, Dedication).

Acknowledgement

With gratitude to Dr Susan Burch of Middlebury College for critically reading and commenting on our draft.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Anderson, Elizabeth. 1995. "Feminist Epistemology: An Interpretation and a Defense." *Hypatia* 10 (3): 50–84.

Ballin, Albert. 1998. *The Deaf Mute Howls*. Edited by John Van Cleve. Washington, D.C.: Gallaudet University Press.

Bauman, H-Dirksen L. 2008. "Listening to Phonocentrism with Deaf Eyes: Derrida's Mute Philosophy of (Sign) Language." *Philosophy of Disability* 9 (1).

Bauman, H.-Dirksen L., and Joseph Murray. 2014. *Deaf Gain: Raising the Stakes for Human Diversity*. Minneapolis, MN: University of Minnesota Press.

Baynton, Douglas. 1992. "A Silent Exile on This Earth." *American Quarterly* 44 (2): 216–243.

Baynton, Douglas. 1998. "Introduction to the Deaf Mute Howls." In *The Deaf Mute Howls*, edited by Douglas Baynton, xii–xxxvi. Washington, D.C.: Gallaudet University Press.

Bellugi, Ursula, Howard Poizner, and Edward Klima. 1989. "Language, Modality and the Brain." *Trends in Neurosciences* 12 (10): 380–388.

Bournot-Trites, Monique, and Kenneth Reeder. 2001. "Interdependence Revisited: Mathematics Achievement in an Intensified French Immersion Program." *The Canadian Modern Language Review* 58 (1): 27–43.

Branson, Jan, and Don Miller. 1993. "Sign Language, the Deaf and the Epistemic Violence of Mainstreaming." *Language and Education* 7 (1): 21–41. doi:10.1080/09500789309541346.

Broun, Leslie, and Lous Heshusius. 2004. "Meeting the Abled? /disabled? Self When Researching the Lives of Disabled Women." *Disability Studies Quarterly* 24 (2): 1–19.

Burke, Edmund. 2001. *On Taste*. Vol. XXXIV, *Part 1. The Harvard Classics*. New York: P.F. Collier & Son, 1909–1914. http://www.bartleby.com/24/1

Carrigan, Emily, and Marie Coppola. 2017. "Successful Communication Does Not Drive Language Development: Evidence from Adult Homesign." *Cognition* 158: 10–27. doi:10.1016/j.cognition.2016.09.012.

Carrigan, Emily, Marie Coppola, and Whitney Tabor. 2014. "The Emergence of Linguistic Use of Space in an Interactive Experimental Gesture Communication Study." In *Talk Presented at the 6th Conference of the International Society for Gesture Studies*, San Diego.

Clerck, Goedele A. M. De. 2010. "Deaf Epistemologies as a Critique and Alternative to the Practice of Science: An Anthropological Perspective." *American Annals of the Deaf* 154 (5): 435–446.

Coppola, Marie, and Jon Henner. n.d. "Language Is Good for Non-Verbal Reasoning, but Not Enough: Homesigners and Unschooled Spanish Speakers on the Raven's Progressive Matrices." University of Connecticut, Storrs, CT.

Coppola, Marie, and Elissa L. Newport. 2005. "Gramattical Subjects in Home Sign: Abstract Linguistic Structure in Adult Primary Gesture Systems without Linguistic Input." *Proceedings of the National academy of Sciences of the United States of America* 102 (52): 19249–19253.

Coppola, Marie, Elizabet Spaepen, and Susan Goldin-Meadow. 2013. "Communicating about Quantity without a Language Model: Number Devices in Homesign Grammar." *Cognitive Psychology* 67 (1–2): 1–25. doi:10.1016/j.cogpsych.2013.05.003.

Cummins, Jim. 1979. "Linguistic Interdependence and the Educational Development of Bilingual Children." *Review of Educational Research* 49 (2): 222–251.

Cummins, Jim. 1980. "The Cross-Lingual Dimensions of Language Proficiency: Implications for Bilingual Education and the Optimal Age Issue." *TESOL Quarterly* 14 (2): 175–187.

Cummins, Jim. 1992. "Bilingualism and Second Language Learning." *Annual Review of Applied Linguistics* 13: 50–70.

Cummins, Jim. 2006. "The Relationship between American Sign Language Proficiency and English Academic Development: A Review of the Research." *Unpublished Paper for the Ontario Association of the …*, 1–18.

Davidson, Kathryn, Diane Lillo-Martin, and Deborah Chen Pichler. 2014. "Spoken English Language Development Among Native Signing Children With Cochlear Implants." *Journal of Deaf Studies and Deaf Education* 19 (2): 238–250.

Desloges, Pierre. 2006. "A Deaf Person's Observations about an Elementary Course of Education for the Deaf." In *The Deaf Experience: Classics in Language and Education*, edited by Harlan Lane, 28–48. Washington, D.C.: Gallaudet University Press.

Edwards, R. A. R. 2012. *Words Made Flesh: Nineteeth Century Deaf Education and the Growth of Deaf Culture*. New York: New York University Press.

Erting, Carol. 1992. "Deafness & Literacy: Why Can't Sam Read?" *Sign Language Studies* 1075: 97–112.

Flege, J. E., G. H. Yeni-Komshian, and S. Liu. 1999. "Age Constraints on Second-Language Acquisition." *Journal of Memory and Language* 41 (1): 78–104.

Gallagher, Deborah J. 2001. "Neutrality as a Moral Standpoint, Conceptual Confusion and the Full Inclusion Debate." *Disability & Society* 16 (5): 637–654. doi:10.1080/09687590120070042.

Garberoglio, Carrie Lou, Stephanie Cawthon, and M Bond. 2016. "Deaf People and Employment in the United States." [n.p.].

Giraud, Anne-Lise, and Hyo-Jeong Lee. 2007. "Predicting Cochlear Implant Outcome from Brain Organisation in the Deaf." *Restorative Neurology and Neuroscience* 25 (3–4): 381–390.

Goldin-Meadow, Susan, and Carolyn Mylander. 1983. "Gestural Communication in Deaf Children: The Non-Effects of Parental Input on Language Development." *Science* 221 (4608): 372–374.

Haraway, D. 1988. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14 (3): 575–599.

Hauser, Peter, Jennifer Lukomski, and Tara Hillman. 2008. "Development of Deaf and Hard of Hearing Students' Exective Function." In *Deaf Cognition: Foundations and Outcomes*, edited by Marc Marschark and Peter Hauser, 286–308. New York: Oxford University Press.

Hauser, Peter, Amanda O'Hearn, Michael McKee, Anne Steider, and Denise Thew. 2010. "Deaf Epistemology: Deafhood and Deafness." *American Annals of the Deaf* 154 (5): 486–492.

Henner, Jon. 2016. "The Relationship between American Sign Language Vocabulary and the Development of Language-Based Reasoning Skills in Deaf Children." Dissertation, Boston University. doi:10.1017/CBO9781107415324.004.

Henner, Jon, Catherine L. Caldwell-Harris, Rama Novogrodsky, and Robert J. Hoffmeister. 2016. "American Sign Language Syntax and Analogical Reasoning Skills Are Influenced by Early Acquisition and Age of Entry to Signing Schools for the Deaf." *Frontiers in Psychology* 7 (December): 1982. doi:10.3389/FPSYG.2016.01982.

Hevey, David. 1993. "From Self-love to the Picket Line: Strategies for Change in Disability Representation." *Disability, Handicap & Society* 8 (4): 423–429. doi:10.1080/02674649366780391.

Hoffmeister, Robert. 2000. "A Piece of the Puzzle: The Relationship between ASL and English Literacy in Deaf Children." In *Lanuage Acquisition by Eye*, edited by Rachel Mayberry and Jill Morford, 141–162. Mahwah, NJ: Lawrence Erlbaum Associates.

Hoffmeister, Robert J., and Catherine L Caldwell-Harris. 2014. "Acquiring English as a Second Language via Print: The Task for Deaf Children." *Cognition* 132 (2). Elsevier B.V.: 229–242. doi:10.1016/j.cognition.2014.03.014.

Holcomb, Thomas K. 2010. "Deaf Epistemology: The Deaf Way of Knowing." *American Annals of the Deaf* 154 (5): 471–478.

Huguet, Angel, Ignasi Vila, and Enric Llurda. 2000. "Minority Language Education in Unbalanced Bilingual Situations: A Case for the Linguistic Interdependence Hypothesis." *Journal of Psycholinguistic Research* 29 (3): 313–333. doi:10.1023/A:1005152305793.

Knoors, Harry, and Marc Marschark. 2012. "Language Planning for the 21st Century: Revisiting Bilingual Language Policy for Deaf Children." *Journal of Deaf Studies and Deaf Education* 17 (3): 291–305.

Ladd, Paddy. 1988. "Hearing-Impaired or British Sign Language Users? Social Policies and the Deaf Community." *Disability, Handicap and Society* 3 (2): 195–199. doi:10.1080/02674648866780171.

Ladd, Paddy. 2003. *Understanding Deaf Culture: In Search of Deafhood*. Bristol, UK: Multilingual Matters.

Landar, Herbert. 1961. "Review of Sign Language Structure." *Linguistic Society of America* 37 (2): 269–271.

Lang, Harry. 2003. "Perspectives on the History of Deaf Education." In *Oxford Handbook of Deaf Studies, Language and Education*, edited by Marc Marschark and Patricia Spencer, 9–20. Oxford: Oxford University Press.

Lenneberg, Eric. 1967. *Biological Foundations of Language*. New York: Wiley.

Liasidou, Anastasia. 2013. "Intersectional Understandings of Disability and Implications for a Social Justice Reform Agenda in Education Policy and Practice." *Disability & Society* 28 (3): 299–312. doi:10.1080/09687599.2012.710012.

Luckner, John L., C. Michele Handley. 2008. "A Summary of the Reading Comprehension Research Undertaken With Students Who Are Deaf or Hard of Hearing." *American Annals of the Deaf* 153 (1): 6–36. doi:10.1353/aad.0.0006.

Lyness, Rebecca, Bencie Woll, Ruth Campbell, and Velia Cardin. 2013. "How does Visual Language Affect Crossmodal Plasticity and Cochlear Implant Success?" *Neuroscience and Biobehavioral Reviews* 37 (10): 2621–2630. doi:10.1016/j.neubiorev.2013.08.011.

Mauldin, Laura. 2016. *Made to Hear: Cochlear Implants and Raising Deaf Children*. Minneapolis, MN: University of Minnesota Press.

Mayberry, Rachel. 1993. "First-Language Acquisition after Childhood Differs from Second-Language Acquisition: The Case of American Sign Language." *Journal of Speech and Hearing Research* 36 (6): 1258–1270.

Mayberry, Rachel, Elizabeth Lock, and Hena Kazmi. 2002. "Linguistic Ability and Early Language Exposure." *Nature* 417 (6884): 38. doi:10.1038/417038a.

Mayberry, Rachel, Jen-Kai Chen, Pamela Witcher, and Denise Klein. 2011. "Age of acquisition Effects on the Functional Organization of Language in the Adult Brain." *Brain and Language* 119 (1): 16–29.

Mayer, C., and G. Wells. 1996. "Can the Linguistic Interdependence Theory Support A Bilingual-Bicultural Model of Literacy Education for Deaf Students?" *Journal of Deaf Studies and Deaf Education* 1 (2): 93–107. doi:10.1093/oxfordjournals.deafed.a014290.

Mellon, Nancy, John Niparko, Christian Rathmann, Gaurav Mathur, Tom Humphries, Donna Jo Napoli, Theresa Handley, Sasha Scambler, and John Lantos. 2015. "Should All Deaf Children Learn Sign Language?" *Pediatrics* 136 (1): 170–176. doi:10.1542/peds.2014-1632.

Mingus, Mia. 2011. "Changing the Framework: Disability Justice." Accessed 29 August 2016 https://leavingevidence.wordpress.com/2011/02/12/changing-the-framework-disability-justice/

Mitchell, Ross E., and Michael A. Karchmer. 2005. "Parental Hearing Status and Signing among Deaf and Hard of Hearing Students." *Sign Language Studies* 5 (2): 231–244.

Mladenov, Teodor. 2016. "Disability and Social Justice." *Disability & Society* 31 (9). Routledge: 1226–1241. doi:10.1080/09687599.2016.1256273.

Moores, Donald F. 2010. "Epistemologies, Deafness, Learning, and Teaching." *American Annals of the Deaf* 154 (5): 447–455.

Newport, Elissa. 1988. "Constraints on Learning and their Role in Language Acquisition: Studies of the Acquisition of American Sign Language." *Language Sciences* 10 (1): 147–172.

Novogrodsky, Rama, Catherine Caldwell-Harris, Sarah Fish, and Robert J. Hoffmeister. 2014. "The Development of Antonym Knowledge in American Sign Language (ASL) and Its Relationship to Reading Comprehension in English." *Language Learning* 64 (4): 749–770. doi:10.1111/lang.12078.

Padden, Carol, and Tom Humphries. 1988. *Deaf in America: Voices from a Culture*. Cambridge, MA: Harvard University Press.

Petitto, Laura Ann. 2000. "On the Biological Foundations of Human Language." In *The Signs of Language Revisited: An Anthology to Honor Ursula Bellugi and Edward Klima*, edited by K. Emmorey and H. Lane, 449–473. Mahweh, NJ: LEA.

Petitto, Laura Ann, Clifton Langdon, Adam Stone, Diane Andriola, Geo Kartheiser, and Casey Cochran. 2016. "Visual Sign Phonology: Insights into Human Reading and Language from a Natural Soundless Phonology." *WIREs Cognitive Science*. doi:10.1002/WCS.1404.

Poizner, Howard, Ursula Bellugi, and Edward Klima. 1990. "Biological Foundations of Language: Clues from Sign Language." *Annual Review of Neuroscience* 13 (1): 283–307. doi:10.1146/annurev.neuro.13.1.283.

Popper, Karl. 2005. *The Logic of Scientific Discovery*. New York: Routledge.

Porter, Jill. 2016. "Time for Justice: Safeguarding the Rights of Disabled Children." *Disability and Society* 31 (8): 997–1012. doi:10.1080/09687599.2016.1223605.

Ray, Sarah Jaquette. 2013. "Normalcy, Knowledge, and Nature in Mark Haddon's The Curious Incident of the Dog in the Night-Time." *Disability Studies Quarterly* 33 (3): 1–13.

Richie, Russell, Charles Yang, and Marie Coppola. 2014. "Modeling the Emergence of Lexicons in Homesign Systems." *Topics in Cognitive Science* 6: 183–195. doi:10.1111/tops.12076.

Roessingh, Hetty. 2005. "BICS-CALP: An Introduction for Some, a Review for Others." *TESL Canada Journal* 23 (2): 91–96.

Rosen, Russell S. 2008. "Descriptions of the American Deaf Community, 1830–2000: Epistemic Foundations." *Disability & Society* 23 (2): 129–140. doi:10.1080/09687590701841166.

Schick, Brenda, Peter de Villiers, Jill de Villiers, and Robert Hoffmeister. 2007. "Language and Theory of Mind: A Study of Deaf Children." *Child Development* 78 (2). Wiley Online Library: 376–396.

Senghas, Richard J., Ann Senghas, and Jennie E. Pyers. 2005. "The Emergence of Nicaraguan Sign Language: Questions of Development, Acquisition, and Evolution." In *Biology and Knowledge revisitedL From Neurogenesis to Psychogenesis*, edited by J. Langer, S. T. Parker, and C. Milbrath, 287–306. Mahwah, NJ: Erlbaum.

Singleton, Jenny L., and Elissa L. Newport. 2004. "When Learners Surpass Their Models: The Acquisition of American Sign Language from Inconsistent Input." *Cognitive Psychology* 49 (4): 370–407.

Soldatic, Karen. 2013. "The Transnational Sphere of Justice: Disability Praxis and the Politics of Impairment." *Disability & Society* 28 (6): 744–755. doi:10.1080/09687599.2013.802218.

Solomon, Andrew. 2012. *Far from the Tree: Parents, Children and the Search for Identity*. New York: Scribner.

Spaepen, Elizabet, Marie Coppola, Elizabeth S. Spelke, Susan E. Carey, and Susan Goldin-Meadow. 2011. "Number without a Language Model." *Proceedings of the National Academy of Sciences of the United States of America* 108 (8): 3163–3168. doi:10.1073/pnas.1015975108.

Stokoe, William C. 1980. "Sign Language Structure." *Annual Review of Anthropology* 9 (1): 365–390. doi:10.1146/annurev.an.09.100180.002053.

Stokoe, William C. 2005. "Sign Language Structure: An Outline of the Visual Communication Systems of the American Deaf." *Journal of Deaf Studies and Deaf Education* 10 (1): 3–37. doi:10.1093/deafed/eni001.

Sugar, Meredith. 2016. "Response to Washington Post Article about Nyle DiMarco: Dispelling Myths about Deafness." *Listening and Spoken Language Knowledge Center*. http://www.agbell.org/in-the-news/response-nyle-dimarco/.

Valente, Joseph Michael. 2011. "Cyborgization: Deaf Education for Young Children in the Cochlear Implantation Era." *Qualitative Inquiry* 17 (7): 639–652. doi:10.1177/1077800411414006.

Valente, Joseph Michael, and Gail Boldt. 2016. "The Curious Case of the Deaf and Contested Landscapes of Bilingual Education." *Equity & Excellence in Education* 49 (3): 336–349. doi:10.1080/10665684.2016.1194101.

Wang, Ye. 2010. "Without Boundaries: An Inquiry Into Deaf Epistemologies Through a Metaparadigm." *American Annals of the Deaf* 154 (5): 428–434. doi:10.1353/aad.0.0119.

Wilbur, Ronnie. 2000. "The Use of ASL to Support the Development of English and Literacy." *Journal of Deaf Studies and Deaf Education* 5 (1). Oxford Univ Press: 81–104.