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Agency at the Seams: A Posthuman Approach to Disability in Family Interactions with Communication Technologies

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AGENCY AT THE SEAMS: A POSTHUMAN APPROACH TO DISABILITY IN FAMILY
INTERACTIONS WITH COMMUNICATION TECHNOLOGIES

by

Mary J. Clinkenbeard

A Dissertation Submitted in
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ABSTRACT

AGENCY AT THE SEAMS: A POSTHUMAN APPROACH TO DISABILITY IN FAMILY INTERACTIONS WITH COMMUNICATION TECHNOLOGIES

by

Mary J. Clinkenbeard

The University of Wisconsin-Milwaukee, 2019
Under the Supervision of Professor Patricia Mayes

“Agency at the Seams: A Posthuman Approach to Disability in Family Interactions with Communication Technologies” explores issues of agency, interdependence, and disability for children learning to use augmentative and alternative communication (AAC) technologies. In this project I use a conversation analytic methodology to examine how parents, children, and therapists interact with each other as they learn to use AAC technologies. I explore how breakdowns in communication occur and how participants work to negotiate and repair uncertainties in communication. My research findings suggest that communication through AAC is a collaborative process that is shaped by the interactions of assemblages of actors and objects. The usability of AAC is impacted not only by the characteristics of the AAC device, but also by the participants’ communication strategies, by objects such as toys, and by their environment. As such, I argue that technical communicators can expand our notions of usability to include human-technology assemblages. Additionally, I argue that the posthuman approach to human-technology relations examined in this dissertation demonstrates the way that agency emerges from the interdependences of assemblages of actors. To help users improve their relations with technologies, we must take seriously their communication practices and examine how different configurations of human technology assemblages bring about different opportunities for acting with and through AAC technology.

To my parents,
Pat and Ken Clinkenbeard,
and to Kal

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Chapter 1 : Introduction

Introduction

Recently, concerns for user agency and social justice have led technical and professional communication (TPC) scholars to ask complex questions about what it means to do research that is inclusive and that is focused on critical action that benefits marginalized or previously excluded people and communities. This concern with social justice has been illustrated in the theme of the 2018 Association for Teachers of Technical Communication Conference and in many recent publications in the field's journals (see for example Agboka, 2013, 2014; Browning & Cagle, 2016; Colton & Holmes, 2018; Haas, 2012; Jones, Moore, & Walton, 2016; Moore, Jones, Cundiff, and Heilig, 2018; Rose & Walton, 2018; and Walton, 2016 to name a few). Understanding, foregrounding, and incorporating user agency and the complex ways that people interact with technologies is central to a social justice approach to research on technologies. TPC scholars have argued for more inclusive approaches that involve working alongside and advocating for oppressed and marginalized groups in our research, communication design, and pedagogy (Jones et al., 2016; Meloncon, 2013; Moore et al., 2018; Palmeri, 2006; Oswal & Meloncon, 2014; Walton, 2016). One area of developing TPC research includes issues of accessibility and user agency for people with disabilities interacting with technologies. This project contributes to this conversation on user agency and accessibility by exploring the experiences of two families whose children have complex communication needs (CCNs)¹ and are learning to use technologies as potential modes of communication. This project follows these families in their journey to integrate high-tech augmentative and alternative communication (AAC) technologies into their daily interactions.

¹ Complex communication needs is an umbrella term which refers to difficulties in producing typical oral of sign modes of speech resulting from a broad range of impairments such as cerebral palsy and cognitive differences such as autism.

The AAC technologies the families in my study interact with include software programs on electronic devices like iPads or tablets that display sets of buttons presenting icons or graphic representations associated with words or phrases that users can select through touch screen technology². Users can select buttons in order to build words or phrases that can then be spoken by the AAC device's computerized voice. As in many instances of technology adoption, the process of learning to interact with AAC is complex and is impacted by a variety of actors³ (Lund & Light, 2009; McNaughton & Light, 2013). The children and families who use these devices face a variety of challenges. For example, families need to learn how to program and customize the AAC to meet the particular needs of children, families, and their communication environments. They also need to develop new communication strategies that can make AAC effective for their everyday communication. Families often have established communication practices, so integrating AAC into these practices takes time and effort in order for the technology to become a beneficial communication mode for users. TPC research has the potential to provide beneficial resources and support for families' experiences with AAC due to our focus on understanding and addressing the complex actors and environments that shape users' interactions with technologies. Technical communication and documentation can be a valuable source of information for these families, and technical communicators may use their role as mediators between companies and users to advocate for users' needs in the design and documentation process. To this end, this project seeks to better understand how families interact with AAC in their daily communication in order to identify challenges that the families face and to consider how these families' interactions with and through AAC inform questions of agency and user empowerment.

² In addition to touch screen technology, high-tech AAC includes a variety of access methods such as eye gaze tracking, pointers, and scanning switches. The families in my study use the touch screen method to interact with the AAC.

³ My use of the term "actor" follows Latour's (1991) use of the term to refer to both human and nonhuman entities that may impact interaction. For a more detailed discussion of this terminology, see chapter three.

This project contributes to research on inclusivity and user empowerment in the field of TPC through its novel approach that combines posthuman theory and conversation analysis of video recorded interaction data to examine how agency emerges micro-elements of interaction⁴ in human-technology relations. TPC scholars have drawn on posthuman theories to explore the impacts of nonhumans on human-technology relations, emphasizing that humans are collaborators along with nonhumans in collective action (Mara & Hawk, 2010; Moore & Richards, 2018; McNely & Rivers, 2014). For this project, I utilize posthuman theory to consider how agency is distributed and enacted in family interactions with AAC technologies. My specific contribution to TPC scholarship is my close examination of how the embodied micro-elements of interaction such as gaze, gesture, and utterances interface with material elements of the AAC technology and of the environment. These micro-features are not often included in TPC research on human-technology relations, but I argue that examining embodied micro-interactions can help us to understand how possibilities for action emerge from the local organization of these micro-features of interaction. In order to explore the impact of these embodied interactions, my project introduces a novel methodology to TPC scholarship. As the technology investigated in this project is used to facilitate communication among multi-parties, I employ conversation analysis (CA)—a methodology developed in the fields of sociology and adapted by interactional linguistics—to examine the micro-features of interaction that impact technology use. In addition to examining the micro-features of human interaction, I adapt CA to explore the detailed ways that nonhuman actors shape interaction and usability issues. These micro-features constitute rich resources to help us better understand the moment-to-moment unfolding of our interactions with technology, offering insights into how challenges and breakdowns arise.

⁴ I use the term micro-elements of micro-features of interactions to refer to human features such as eye gaze, gestures, and utterances from which constitute interaction.

Ultimately, I use the findings of my research on families' interactions with AAC to consider how a posthuman approach to agency in human-technology relationships can be incorporated into the very human concern for improving the experiences of people with disabilities interacting with technologies. This use of posthuman theories and praxis has been emphasized in technical communication research focused on social justice. In writing about the potential of posthuman theories for extending the humanist concern for user experience and agency in TPC research and practice, Richards and Moore (2018) write:

To draw attention to the limits of humanism is not to “move beyond” these experiences and obligations, or to fully discard our distinct and proud humanistic roots; rather, to attend to the limits of humanism can engage the possibility that posthuman theories might help us do this kind of work *better*, not by loosening our grip on the individuals and communities we help but by acknowledging the ever-influential roles other technologies and bodies are having in these processes. (p. 7)

TPC scholars who wield posthuman theories argue that these theories can be used to attend to the ways that humans and technologies interact, and how these interactions shape use and possibilities for user agency in unanticipated ways (Rivers & Söderlund, 2015). Although posthuman approaches to human-technology relationships opens up agency to nonhuman actors, this opening up should not neglect attention and purpose toward the needs and experiences of humans. Rose and Walton (2018) write, “While posthumanism directs us to ascribe status and agency to things, our main concern remains on the impact and effect on *people*. We are interested in things because they inhabit spaces and exert agency on people and have material effects” (p. 111). Following the lead of these scholars, I employ a posthuman theoretical framework to explore how a collective and distributed notion of usability and human-technology interaction can help technical communicators to better understand the complex process of technology adopt and the ways that this process is shaped by the

collective action of a variety of human and nonhuman actors. In taking a posthuman theoretical approach that is aimed at considering how families and children work to improve their experiences interacting through AAC, I explore technology adoption as a process of *interdependent care work*. Mol, Moser, and Pol's (2010) notion of *care in practice*⁵ locates care in daily, iterative sociomaterial practices. These authors argue that care is not only about finding the right knowledge, technology, or technique to address a task, but is also about adapting the tools at hand to the needs of the various actors through the process of *tinkering*. This project adopts a perspective of technological adoption as a process of care work by examining the daily interactions that enact and constitute care in AAC communication.

Background

Augmentative and Alternative Communication

Computer software and hardware systems are increasingly being developed and used to help facilitate communication for people with a range of disabilities or experiences that limit their production of verbal or signed speech. These technologies, as previously mentioned, are called augmentative and alternative communication (AAC) systems. Speech language pathologists often recommend that children with CCNs integrate AAC into their existing modes of communication (such as sign language, gestures, etc.), providing additional potential for children to communicate and interact with the world around them. In this sense, the speech language pathologists that I interviewed for this project argued that AAC technologies function as an extension of the person's voice. These speech language pathologists also emphasized that AAC does not replace other modes of communication, rather it should be seen as a component of a person's communication network.

⁵ Disability studies scholars like Jenny Morris (1997) have critiqued notions of care that rely on medical models of disability to frame people with disabilities as helpless and in need of the care of nondisabled caregivers (Kröger, 2009). In contrast to this view of care, I use the term care as a mutual process of working toward improving human-technology assemblages. Disability studies concerns regarding care and caregivers will be discussed later in the chapter.

In the past decade, mobile technologies such as tablets and cellphones have proliferated bringing AAC technologies into more and more homes and into many families' daily interactions (McNaughton & Light, 2013). While there are obvious benefits of increasing access to AAC for children and families, these technologies do not come without their challenges. McNaughton and Light (2013) have pointing out that the revolution in mobile technology and the ubiquity of applications for these technologies has diffused families' and children's access to support services and evidence-based knowledge and practices that surrounded traditional institutionally provided AAC technologies and therapy. In other words, since families are able to access apps on mobile devices without the professional support or the mediation of educators or speech language pathologists, families may find themselves in situations where they have increased access to complex AAC technologies, but do not have access to the networks of actors and support services who can help them to engage with the technologies in beneficial and effective ways. This situation is particularly disconcerting in regions of the United States where government funded support services and programs for people with disabilities are being cut from state budgets. In our technocapitalist culture, increased access to technology is often promoted as an antidote to cuts to social services and public education (Tucker, 2017). Technophilic discourses in popular and commercial rhetoric position technologies as ready-made solutions to complex problems and as liberators or saviors of people with disabilities. While technologies have great potential to contribute to greater equality and access for people with disabilities, I argue that providing access to technologies does not ensure that technologies will be usable or beneficial to users. The ways that technologies come to be beneficial to users are complex and involve many different actors. Under a neoliberal approach, technology is promoted as the solution to complex problems that should be addressed through more extensive political, cultural, and local change. Technologies promoted as saviors for people with disabilities stigmatizes people with disabilities as in need of a cure or rehabilitation and positions the use of

technology by people with disabilities as different from the use of technologies by nondisabled people. Even technologies as seemingly transparent and purposeful as AAC devices may be incorporated into technocapitalist practices when they are promoted as ready-made solutions for complex communication challenges. Such approaches to technology subordinate people with disabilities, framing them as helpless without technology and tech companies. Consequently, research is needed to identify the challenges that children and their families face when learning to interact with and through AAC—in order to better understand how this technology is integrated into families' communication networks and the care work that children, families, and other supporters do in the process of technology adoption. To this end, this project examines issues of agency in human-technology relations for children with disabilities and their families as they work to integrate AAC technologies into their home interactions.

Technologies and User Agency

Technologies play complex roles in issues of agency, particularly for people with disabilities. As previously mentioned, popular rhetoric portrays technologies such as wheelchairs, communication technologies, and cochlear implants as liberating—helping people with disabilities to gain independence (Moser, 2006; Tucker, 2017). However, disability studies scholars have critiqued these views, arguing that while technologies are vitally important to the lives of people with disabilities, these technologies are often entrenched in sociomaterial practices and ideologies that stigmatize different ways of doing and being by mobilizing normative standards of independence (Gibson, Carnevale, & King, 2012; Moser, 2001, 2006). Foley and Ferri (2012) write:

Technology, for instance, privileges particular ways of being, which are grounded in normative, social, cultural and economic practices, further reified in the design, manufacture, marketing and implementation of technology. In other words, technology is designed in ways that reflect taken-for-granted ideas about what constitutes normal. (p. 192).

The design of technology often reflects ableist social assumptions and values regarding how people should live or interacted in the world. Tucker (2017) writes, “The rhetoric surrounding access, disability, and technology marks disability as something to be fixed, reinforcing ableism”.

Perceptions of what needs to be cured or fixed are based on ableist assumptions about what normal bodies look like and what they do. Prioritizing a normalized view of independence through technology use often neglects the interdependencies required for technologies to function in ways that are beneficial to users (Elmore, 2013; Gibson, 2006; Moser, 2006). The agentic tensions surrounding technology use necessitate theories of agency and social action that can account for processes that bring about opportunities for action and the diverse actors involved in these processes. This project explores how TPC scholarship can theorize agency and technology use in ways that are inclusive and align with the social justice approach to technology use by considering the complex interactions that help to create beneficial relations among people with disabilities and the technologies they use.

Agency in TPC scholarship

Agency is an important issue for social justice oriented TPC research and theory (Jones et al., 2016; Moore et al., 2018; Rose & Walton, 2018). TPC scholars working on issues of social justice ask us to consider how our research contributes to power dynamics in relationships between people, technologies, and communication. For Jones et al. (2016), inequalities in power dynamics necessitate that technical communicators reconsider how our research and work promotes certain voices while silencing other voices. These scholars ask us to not only consider but to also take action toward promoting agency for oppressed and marginalized groups through our research and practice. Creating more inclusive research and practices must involve “efforts to forward a more expansive vision of TPC, one that intentionally seeks marginalized perspectives, privileges these perspectives, and promotes them through action” (Jones et al., 2016, p. 213-214). To address these concerns,

recent TPC research has tackled issues of user empowerment in relation to disability and accessibility and has foregrounded several important observations about technical communication, agency, and disability. First, this literature suggests that as TPC practitioners and scholars, we need to be mindful of the ways that our work can privilege an ideal⁶ or default user and exclude users that may interact with technology in different ways (Oswal, 2013; Palmeri, 2006). Palmeri (2006) argues that although it is imperative that we consider the accessibility of our communication and technologies, we should be careful not to stigmatize users by viewing technology adaption and accessibility as isolated practices that manipulate pre-designed technologies and environments as to provide a minimum standard of functionality for people with disabilities. Palmeri explains, “Rather than just ensuring that our texts can be read by adaptive technologies, we should begin to argue for deep structural changes that could make all technologies more accessible and that could provide all people with more choices for accessing content” (p. 56). Universal Design principles mandate that our work should start with the goal of making our communication and technologies available to all. As Palmeri (2006), Elmore (2013), Oswal (2013a), and others have argued, this requires involving people with diverse needs and ways of interacting with technologies in the research and design process from the beginning rather than designing for a nondisabled user or imagining the experiences of people with disabilities interacting with technologies. Integrating accessibility throughout our research and design processes can benefit everyone by making a variety of options available for people to interact with. Working toward more accessible practices also requires that we

⁶ I use the term *ideal* to reference the ideology of normalization whereby bodily averages come to represent the norms or standard to which all bodies are compared. Grue and Heiburg (2006) explain that statistical averages of bodies in the 19th century were used to justify the privileging the middle class and the eugenics programs of the 20th century. Under this view, variation was considered abnormal unless of course the variation was seen as progressive variation by eugenics advocates. The average also became an unrealizable ideal and standard to which bodies which are different in socially stigmatized ways are compared. I use *ideal* here to describe the usability practices that privilege the perspectives and experiences of users whose bodies more closely reflect idealized norms.

acknowledge that making technology and communication accessible is a right for people with disabilities and not a charity or gift (Oswal, 2013a). This work helps to emphasize the urgency of designing for diverse user needs and desires.

Additionally, in working to promote user agency, TPC scholarship has focused on users' embodied experiences with technology and the importance of recognizing diverse bodies in our design and scholarship. Meloncon (2013) argues that to better understand how people interact with technologies, TPC scholars need to explore users' bodily experiences with technologies. Meloncon explains, "Since we gather and obtain knowledge beyond the physical limitations and restrictions of our bodies, our bodies are often extended into different locations" (p. 69). Exploring embodiment helps to reveal how our interactions with technologies, environments, or social relations are not always smooth or trouble free and often lead to breakdowns where people whose bodies differ from an ideal user model may be excluded. Rosemarie Garland-Thomson's (2011) materialist feminist concept of "misfit" is particularly helpful for theorizing the value of embodied experiences in the world and for thinking about exclusions. For Garland-Thomson, the concept of misfit characterizes the ways that bodies move in the world and the "harmony" or "disjunction" that results from these movements. Garland-Thomson explains, "Misfitting serves to theorize disability as a way of being in an environment, as a material arrangement" (p. 594). Thus, "misfitting" reveals disability as a result of the sociomaterial conditions of interacting in the world. Disability is not simply an impairment located in particular bodies as in the medical model of disability, nor is it solely a social construction because it results from embodied, material relations among various actors, social forces, and environments. As such, disability studies scholars and activists are concerned with working to challenges and change both the social and the material exclusions of misfitting that many people with disabilities face. Technical communicators can help do this work by attending to users' embodied experiences with technologies and texts.

Examining misfittings helps to make clear the difficulties and tensions that arise when people interact with technologies, and specifically highlights the tensions between the benefits and costs for people with disabilities interacting with technologies. Critiquing theories that idealized the embodied experiences of people with disabilities interacting with technologies, Siebers (2001) argues for a better understanding of the “physical realities of the disabled body” (p. 749). Siebers explains that for people with disabilities

The challenge is not to adapt their disability into an extraordinary power or an alternative image of ability. The challenge is to function...People with disabilities want to be able to function: to live with their disability, to come to know their body, to accept what it can do, and to keep doing what they can for as long as they can. (p. 750)

Siebers emphasizes the need to account for the lived experiences of people with disabilities interacting with technologies beyond theoretical representations of disabled bodies as ideal subjects of new technologized agency. Embodied experiences show that agency is more than a theoretical concept, a representation, or subject position for people with disabilities. It is an embodied experience that arises from sociomaterial interactions in the world. Consequently, as we develop and enact theories of agency in TPC, we must consider embodied experiences with technology examining both the struggles and possibilities for action that arise from these experiences.

Posthuman Theoretical Framework

This research project addresses TPC’s concern for understanding embodied user experiences and agency in human-technology relations by employing a mixed methods approach of ethnography and conversation analysis to consider how agency is enacted, distributed, and constrained through communication breakdowns and boundary enacting practices⁷ in two families’ who use of AAC.

⁷ I will describe what I term as communication breakdowns and boundary enacting practices later in this introduction.

Previous TPC research on agency in human-technology relations often explores how agency is enacted through the production or use of technologies, artifacts, or documentation and examines the power differentials that are enacted in these processes. However, understanding agency in the moment-to-moment unfolding of our interactions with technologies is underexplored in our field. This project examines how the embodied micro-features of interactions—such as gaze, gestures, utterances, AAC screen displays, and physical orientation—shape possibilities for future action. This mixed-methods approach which combines ethnography and conversation analysis allows me to bring to rhetorical criticism a fine-detailed analyses of embodied modalities including gestures, vocalizations, and eye gaze. Conversation analysis highlights ways that communication is impacted and shaped by negotiation among complex collectives of actors at the micro-level. Through interweaving these different methodological and theoretical approaches, my study offers new insights into the ways that macro-level concepts such as agency and independence can be enacted through and shaped by micro-level interactions with technologies.

Additionally, my project research engages with posthuman and disability studies theoretical approaches in TPC and science to consider how human-technology interactions are networked and shaped by both human and nonhuman actors. Specifically, I argue that theorizing agency as relational and posthuman helps to demonstrate how possibilities for change emerge from the interactions of various actors and how these relations shape collective action. This blending of posthuman theory and interaction-oriented analysis helps to situate the challenges users encounter interacting with technologies within networks or relations among various actors. Finally, this project explores the implications of my findings for usability research and development.

Agency and Technology in Corporate Rhetoric

Commercial and popular rhetoric tends to position technologies and tech corporations as agents that bring liberty and offer charity to people with disabilities. In general, corporate discourse

may enact a varied of identities in relation to agency and social change that position corporations and technologies as both actors that bring about agency and as supporters that assist the agentive actions of individuals and communities. Mayes (2010) shows how rhetoric on Starbucks' website positions the company in different semantic roles that enact a corporate identity as an active doer of corporate responsibility and as a partner in a global community working toward social responsibility. Mayes (2010) points out that in some cases in the website Starbucks is positioned as the semantic argument, the doer of corporate responsibility actions, in sentence structures while in other cases, Starbucks is represented as the experiencer of praise or learning surrounding corporate responsibility work. Additionally, Starbucks is sometimes positioned as the implicit contributor to a semantic agent who is doing the work of social change. This positioning aligns the company with the agent doing the action and implies that Starbucks supports and participates in the collective action of social change. Mayes points out that these different roles help to position Starbucks as a doer and as a partner in social responsibility, "helping" and "supporting" villages, farmers, and other organizations to bring about positive change (p. 617). Furthermore, this rhetoric positions the act of consuming Starbucks products as contributing to positive social change, aligning the company and its potential consumers in a collective notion of social action (Mayes, 2010, p. 619). Mayes argues that the rhetorical strategies that Starbucks uses to enact a corporate responsibility identity shows that marketplace values and practices have become increasingly linked to social values, so that social values such as being a good citizen or working toward social change are equated with consumer behavior (p. 624). Mayes' work illustrates the nuanced and dynamic ways that corporations position themselves in relation to agency, enacting identities as doers and as participants in collective action in cases where these identities are socially profitable.

Mayes' research is interesting when compared to the ways that companies often position agency in relation to technology and people with disabilities. Rather than positioning themselves as

partners in social change as in the Starbucks case, corporate rhetoric often positions technologies, companies, or representatives as liberators of people with disabilities, where people with disabilities are the passive beneficiaries of the work or charity of corporations or their representatives—an identity that the companies likely consider socially profitable. Tucker (2017) shows how the commercial rhetoric of tech companies positions technologies as saviors for people with disabilities who are positioned as the passive beneficiaries of the technology companies' good will. Tucker (2017) explains,

Tech companies bolster their own public images, suggesting that it is Duracell or Apple who have agency, not disabled people. Ultimately, the rhetoric makes use of and objectifies disabled people as technologies, while at the same time reinforcing ableist narratives of overcoming the “problem” of disability through developing technology that allows disabled people to “pass” as non-disabled.

Corporate rhetoric, like that examined by Tucker, uses technology in a metonymical relationship with corporations, where a technology is representative of the corporations' work. This positions technology as the agent and the company as a provider of agency. This rhetoric works to erase the agency of people with disability enacting people with disabilities as helpless receivers of the corporation's charity.

To illustrate this trend in the ways that agency is enacted in relation to disability in corporate rhetoric, I will briefly analyze a clip from a 2018 TV commercial produced by Johnson & Johnson that includes a series of vignettes about the work of nurses. The vignette that I discuss here presents the story of a nurse who developed an AAC app to help people with cerebral palsy communicate in medical contexts. In the clip, a voiceover narration says “[...] and cerebral palsy robbed many patients of their ability to speak, until a nurse gave them back their voices.” While this voiceover plays, a video shows a lobby type room filled with sunlight. In the room, a young woman,

presumably with cerebral palsy, is seated in a chair with wheels on each of its legs. The chair has a curved arm that branches off of the arm rest to which an AAC device is attached. The AAC screen is positioned facing the woman sitting in the chair. The commercial cuts to a close up of the young woman in the chair as a nurse sits down behind her also facing the AAC device. The next cut shows a close up of the AAC device and its screen. The name of the software app, “Speak for Myself”, is displayed across the top of the device. Below the software name is a text box displaying the sentence “And I will always be grateful to her”. A hand (presumably that of the young woman) reaches out and touches a “speak” bar on the screen, and the device’s electronic voice speaks the sentence displayed on the screen aloud. When the device speaks, the nurse, who is sitting behind the woman and facing the screen, looks at the woman in the chair and then reaches out and gently caresses the woman’s hair. The woman with cerebral palsy who is seated in the chair then lifts her gaze as if to look at the nurse who is seated behind her and smiles. Then she looks back to the AAC screen. In my analysis of this commercial, I will show how the components of this commercial enact an ableist view of disability and technology, one that I argue is typical of commercial and popular rhetoric surrounding technologies for people with disabilities.

In the commercial, the woman with cerebral palsy is positioned as a passive beneficiary of the work of a single nurse and implicitly of Johnson & Johnson who “support” nurses as the commercial goes on to say. This commercial does this positioning in several ways. First, people with cerebral palsy are described as “patients” who have been “robbed of their ability to speak” by the disorder. This rhetoric indexes a medical model of disability that locates disability as an individual problem within a person’s body, rather than as a social and material experience. This disability ideology is further enacted in the way that the nurse is positioned both physically and discursively in the commercial. In the voiceover narration the nurse is said to have *given* people with cerebral palsy back their voices. The nurse occupies the role of the agent and doer of the action, while the

community of people with cerebral palsy is positioned as “them”, the patients or recipients of the nurse’s action. They are “robbed”, and thus helpless without the work of the nurse. Furthermore, in the commercial, the nurse is seated behind the woman with cerebral palsy so that they both face the AAC screen rather than each other. This physical arrangement of their bodies suggests that the nurse is in a communicative relationship with the technology rather than with the woman in the chair. She is not facing the person with cerebral palsy as one might in a typical conversation. Rather, she is attending to what is displayed on the screen and her physical orientation suggests that technology is the center of the interaction and is a surrogate for the person who speaks through it. The rhetoric of corporate agency is further illustrated by the fact that the name of the nurse who developed the app is never mentioned, but the name of app brand is clearly displayed in the close up shot of the AAC screen. Displaying the brand name of the app associates it with the work of giving people with disabilities voices. It suggests that technologies can function as solutions to *the problem of disability*.

In contrast to this corporate rhetoric which positions disability as a problem to be fixed or cured through technology, disability studies scholars argue that ableist ideologies that are designed into technologies and environments are the problem (Oswal, 2013a). Disability studies approaches recognize that people are disabled when they encounter technological, environmental, and social barriers that limit their participation in society. Furthermore, this corporate rhetoric reduces the work of inclusion and equality to consumption of singular technologies. Tucker (2017) argues that corporate rhetoric, like that examined above, co-opts the power of the disability rights movement by removing agency from the site of politics to the site of commercial profit. Corporate rhetoric often neglects the complex disability rights histories and advocacy that have brought about greater inclusion for people with disabilities. This move is clear in the Johnson & Johnson commercial analyzed above. In this commercial the nurse is credited with the development of AAC technology

when in reality AAC technologies have existed long before the specific app referenced in this commercial was developed. In fact, AAC technology development coincides with the disability rights movement which was driven primarily by activists with disabilities. The history of AAC and the roles of people with disabilities in advocating for their rights is not mentioned in favor of portraying the nurse, the technology, and in tandem Johnson & Johnson, as the savior of the community of people with cerebral palsy.

In this scenario, people with disabilities who have fought for equal treatment are reduced to the passive beneficiaries of the power and charity of technology and tech companies. This rhetoric invokes a medical model of disability where tech companies and technologies rehabilitate a passive user. The role of people with disabilities as self-advocates is erased by narratives that position people with disabilities as helpless and in need of the charity of caregivers and companies. This rhetoric positions people with disabilities as dependent upon caregivers, technologies, and tech companies. Ultimately, this vein of tech company rhetoric contributes to technophilic ideologies—an uncritical celebration of technology as the solutions to the inequalities and challenges that people with disabilities face. Furthermore, rhetoric of the Johnson & Johnson commercial creates an unequal hierarchical relationship between people with disabilities and care workers like nurses in that it positions people with disabilities as helpless, passive, and in need of the charity of caregivers.

Having made these critiques, it's important to note that technology and companies can play valuable roles in working alongside people with disabilities to address inequalities and improve their lives. In examining the potential of technologies for people with disabilities, it is imperative push back against corporate rhetoric and practices enact ableist ideologies of disability. As disability studies scholars have argued, technologies and caregivers should not be positioned as saviors for people with disabilities (Tucker, 2017). Part of this pushing back requires that we refuse to accept narratives that position technologies as ready-made solutions to the complex challenges that people

with disabilities encounter when interacting with technologies and with the world. We must consider both the benefits and costs of adopting various technologies and to consider how these technologies impact the lives of people with disabilities and the networks in which they live and move. This analysis of the potential harm of corporate and popular rhetorics that enact technologies as agency givers for people with disabilities serves as an exigency for this study. This project explores alternative approaches to agency in human-technology relationships that can challenge the myth of technology as savior. Exploring agency in children's and their parents' interactions with AAC is vitally important for understanding how technologies are emmeshed in networks of complex actors and how agency emerges through interdependences within these networks.

Agency in Human-Technology Assemblages

Adopting a posthuman approach to micro-level interaction has important implications for conventional perspectives of technology and agency. Namely, it requires us to rethink the way that we position technologies or other nonhumans entities as simple tools for accomplishing human intentions. Although it is true that technologies, like many artifacts, objects, and ideas, can be described as tools that human manipulate to achieve specific tasks, their use and function is always mediated through networks of actors and, thus, agency is distributed throughout these networks. Similar to the examples from corporate rhetoric, technologies are often problematically positioned as tools for rehabilitation that focuses on manipulating the bodies of people with disabilities toward a idealize standard of normality. Garland-Thomson (2011) writes, "Our conventional response to disability is to change the person through medical technology, rather than changing the environment to accommodate the widest possible range of human form and function" (p. 603). Disability studies scholars have argued against locating disability within the bodies of individuals as in the medical model of disability and against a rehabilitative modal that seeks to erase differences in the body

through treatments. Instead, disability activists argue for working to change both the environment and social material practices that lead to inequalities and that devalue difference.

The previous section demonstrates that the positioning of agency in relation to technology can contribute to unethical, profit-drive, and ableist representations of disability. Corporate rhetoric which alternates between framing technologies as passive tools or, in contrast, as saviors of people with disabilities, present a reductionist view of agency. Ultimately, both approaches to agency position people with disabilities as passive recipients of the agency of corporations, technologies, or caregivers. This reductive view of agency neglects the networked impacts of technologies and unexpected and uncontrolled ways that people with disabilities, along with technologies, and other actors shape possibilities for action. My project interferes with views of rhetoric, interaction, and agency that prioritize the intentions of singular human actors by revealing how communication breakdowns result from unintended and unexpected interactions of both humans and nonhumans. I argue that in these interactions, nonhuman entities do not merely function as tools to achieve rhetorical purposes or as the source of agency. Instead that the breakdowns and boundaries that emerge through interactions offer agentic spaces at the seams of human-technology assemblages, where these assemblages may be renegotiated and shaped into new forms of interaction.

Technology in Care Practices

Although the theoretical approach I adopt in this project is posthuman in the sense that it theorizes that nonhuman actors, along with human actors, make active and unexpected contributions that shape agency, the purpose of this project is very much oriented towards the human experience of children with disabilities interacting with their worlds. Namely, I hope that the work of this project can explore how children and their communication partners do the work of caring for their human-technology assemblages—how they negotiate breakdowns and reconfigure their communication strategies and technology to better meet their needs.

The relationship between caregivers and those they support has a problematic history due to the fact that caregivers have historically been positioned in roles of power over people with disabilities. Kröger (2009) writes, “Care as a concept has symbolized a century-long confinement of disabled people into institutions and of lives controlled and colonized by others, by professional social workers and by care providers as well as by other family members, who are defined as ‘informal carers’” (p. 403). Disability studies scholars have critiqued notions of care that position people with disabilities as dependent upon caregivers and argue that relationships traditionally noted as care or charity should be understood as civil right for people with disabilities (Kröger, 2009). In contrast to the problematic ideology that denies the agency of people with disabilities in relation to caregivers, for this project I draw on a concept of care that is rooted in the collective action that attends to, reconfigures, and works to improve human-technology relationships. Under this notion of care, care work is not the action of a caregiver, but rather the collective and collaborative actions that people with disabilities and those that support them participate in to improve their experiences. For example, in her research on how people make adjustments to wheelchairs, Winance (2010) notes, “Here, care bespeaks a sensitivity shared and distributed among the actors. The object of care is not a single person but a collective. The work of caring involves the attention that is built by the collective and distributed towards the sensations and possibilities for action that emerge for the person concerned” (p. 102). I have chosen to ground this project’s posthuman approach in this collective notion of care work.

Mol et al.’s (2010) note in their introduction to *Care in Practice: On Tinkering in Clinics, Homes and Farms* that much of “care work is not *bought*, but actually *done* by patients⁸” (p. 9). This notion of care resonates with TPC scholarship that examines the role of users in shaping their relations with

⁸ Mol et al. (2009) use the term *patients* here to generally refer to those who receive services in clinical contexts—not to refer to people with disabilities.

technologies, not simply as consumers or passive experiencers of technologies and communication, but as makers of the rhetorical and material practices they engage in with technologies (Bellwoar, 2012; Hallenbeck, 2012). This project is particularly concerned with the ways that AAC technologies, technology users, and other actors do the daily work of caring for, cultivating, or even neglecting the relationships between humans and technologies that make possible or constrain certain types of action for the children participating in this study. Mol et al. (2010) emphasize the importance of care as a local practice of “tinkering”—of remaking and revising our evolving relationships with technologies. They describe care in this way:

Engaging in care is not an innate human capacity or something everyone learns early on by imitating their mother. It is infused with experience and expertise and depends on subtle skills that may be adapted and improved along the way when they are attended to and when there is room for experimentation. Technologies, in their turn, are not as shiny, smooth and instrumental as they may be designed to look. Neither are they either straight-forwardly effective on the one hand, or abject failures on the other. Instead they tend to have a variety of effects. Some of these are predictable, while others are surprising. Technologies, what is more, do not work or fail in and of themselves. Rather, they depend on care work. On people willing to adapt their tools to a specific situation while adapting the situation to the tools, on and on, endlessly tinkering. (p. 14-15).

Mol et al.’s (2010) definition emphasizes care as an evolving practice that involves coordination and collaboration of humans and technologies. I wish to capture this evolving practice of care by examining the micro-level interactions of parents and children engaging with AAC technologies in their daily lives. For this project, this means examining elements of interaction that are typically excluded from rhetorical accounts of communication, such as the coordination and sequencing of gestures, facial expressions, eye gaze, and utterances. I consider how these elements of human

interaction interface with elements of the technology as computer generated sounds and screen displays that emerge as relevant in the interaction. Attending to relationships and interactions among these micro-elements of interaction has potential to open up new insights into the ways that we do the work of care—caring for each other, ourselves, and technologies and for relations among these actors. For the field of TPC, this means considering potential new types of data and methods to examine the micro-elements of human-technology relations.

Finally, framing interaction as care in practice aligns with posthuman notions of agency as care is about doing and interacting in local relationships. Agency is not brought about by simply purchasing technologies or by making a perfect technology that erases difference as corporate and popular rhetoric suggests. Instead, I argue that agency comes about through remaking ongoing relationships and reconfiguring these relationships to the needs of local participants. Here agency is less about normalized standards of independence for people with disabilities than it is about finding ways of continually coordinating actors and actions to improve the lived experiences of people with disabilities. Rather than promoting technologies as liberators bringing independence for people with disabilities, a care as practice approach traces agency through interdependencies. As Mol et al. (2010) express, “Crucially, in care practices what it is to be human has more to do with being fragile than with mastering the world. This does not imply a docile acceptance of fate: care is active, it seeks to improve life” (p.15). Being fragile means being open to change and new ways of doing, of being open to uncertainties and new partnerships with technological and human actors. It can also include experiences of failure where relationships need to be revised and remade to better meet the needs of people with disabilities. Posthuman agency recognizes that people with disabilities should not have to depend on notions of agency that neglect the complexities and assemblages that shape their interactions with the world.

Since the purpose of examining these assemblages is to improve the lives and experiences of people with disabilities interacting with and through technologies, it's necessary to consider what makes care good care. Mol et al. (2010) argue that good care is not so much a product or set of standards as it is a practice of reconfiguration and change:

Care implies a negotiation about how different goods might coexist in a given, specific, local practice. Though 'negotiation' is not quite the right term, as it calls up verbal argumentation. In practice, however, seeking a compromise between different 'goods' does not necessarily depend on talk, but can also be a matter of practical tinkering, of attentive experimentation. In care, then, 'qualification' does not pre-cede practices, but forms a part of them. The good is not something to pass a judgement on, in general terms and from the outside, but something to *do*, in practice, as care goes on. (p. 13)

Good care, then, as a practice of doing, of change in relations, is aligned with my project's notion of negotiating breakdowns and boundaries. Good care emerges as practices that help to change and reconfigure assemblages so that more beneficial outcomes result from these relations. I argue that communication breakdowns and boundaries offer spaces of agency where care assemblages can be reworked to provide possibilities for future actions that may better benefit the children and families interacting with AAC.

Communication Breakdowns and Boundary Enacting Practices

In my research, I explore agential interaction spaces that result from boundary enacting practices and communication breakdowns. Although I describe both concepts in more detail in Chapters 2 and 3, I offer a brief description here and I connect them to rhetoric scholarship on prosthesis and *mētis*. In this project, I follow conversation analytic and language social interaction approach to identify a breakdown as a space in communication where a source of trouble causes participants to renegotiate the shared understanding of the situation at hand. Communication

breakdowns are the result of the uncertain and negotiated nature of communication and help to reveal differences in understanding and misfits among actors in interaction. Examining how interlocutors respond to, negotiate, and repair breakdowns helps to reveal how communication is intersubjective and emerges from collaborative meaning making practices rather than the intentions of a single rhetor (Goodwin, 2004). Similar to breakdowns, when actors in assemblages enact boundaries in their relations, this opens up certain potential actions and constrains other actions. Consequently, enacting boundaries offers a range of possibilities that actors may align with or disengage from. I argue that breakdowns and boundaries constitute spaces of agency where assemblages can be reworked, offering new possible actions.

Breakdowns and boundaries in assemblages reveal the ideal body or ideal assemblage is a myth and illuminates the ways that bodies as collectives are always shifting. Disability studies scholars use the notion of prosthesis to explore tensions and shifts in bodily assemblages. Prosthesis, or the process of modifying the body in some way as to “restore it to some semblance of wholeness”, reveals the stigmatization of bodily differences (Mitchell & Synder, 2000, p. 6). Mitchell and Synder (2000) write, “If disability falls too far from an acceptable norm, a prosthetic intervention seeks to accomplish an erasure of difference all together; yet, failing that, as is always the case with prosthesis, the minimal goal is to return one to an acceptable degree of difference” (p. 7). Mitchell and Synder describe prosthesis from a medical and rehabilitative model of disability as a process of modifying disabled bodies to fit notions of the normal. Their point that prosthesis always fails reveals the ways that bodies always differ from the idealized norm because bodily realities are never the same. Mitchell and Synder (2000) explain that “all bodies are deficient in that materiality proves variable, vulnerable, and inscribable” (p. 7). For these scholars, prosthesis is a way of covering over or hiding difference. Pushing back against rhetoric that smooths the fissures of technology-human collectives, Booher (2010) argues that we need to understand “the messiness, the

true interactivity, the liminal space of reconceiving the relationships of lived bodies and technologies” (p. 86). Alternatively, prosthesis can be understood in a more productive way as an act of assembling bodies. Mitchell and Synder (2000) argue that prosthesis can be examined to reveal embodied realities of assemblages that challenge social norms that stigmatize and exclude disabled bodies. I argue that the notion of communication breakdowns, like prosthesis, highlights the interdependences of bodies in interaction. Examining the messy, embodied interactions of prosthesis shows how these interactions bring about openings or spaces for reworking and improving human-technology relationships.

Dolmage’s (2014) uses of the rhetorical device *mētis* bears similarity to Mitchell and Synder’s (2000) discussion of prosthesis in that it focuses on embodied knowledge as a space of agentive change. Dolmage uses *mētis* as a means of critiquing and reinterpreting the many representations of disability in Greek mythology and in contemporary film. Dolmage (2014) writes, “*Mētis*...is the craft of forging sometime practical out of the possibilities, practicing an embodied rhetoric, changing the world as we move through it” (p. 149). For Dolmage, *mētis* is a creative rhetoric, like prosthesis, that draws on the bodily variation to generate new meanings and counter-interpretations of stigmatized representations of disability. Although Dolmage’s exploration of *mētis* is focused on narrative and literary representations, I connect it to my project’s examination of family interactions with technology because I believe it reflects the process of negotiating communication breakdowns or boundaries. Much like Mol et al.’s (2010) notion of local tinkering, Dolmage (2014) describes *mētis* as an intensely practical and embodied process of creating change out of existing relations. Communication breakdowns and assemblage boundaries offer spaces for *mētis* to work. In situations of breakdown, which occur in all communication, participants remake and negotiate their embodied entanglements in order for the interaction to continue.

The fissures that my project examines are not merely divisions between humans and machines, but more often are fractures among assemblages that arise when humans and nonhumans position themselves or are positioned through alignment with or disengagement from other actors during interaction. In his book *Action and Agency in Dialogue: Passion, Incarnation and Ventriloquism*, François Cooren (2015) argues that actors—both human and nonhuman—mediate material-discursive interactions in such a way as to prompt other actors to respond to, account for, align with, or disengage from each other in the negotiation of meaning and action. On this view, boundaries in interaction are not singularly constituted by a human responding to another human, but rather boundaries are enacted as actors aligned with or disengaged from statements, gestures, objects, and other entities that intervene in and come to constitute the interactional assemblage. The theoretical positioning of Cooren's ventriloquism extends the boundaries beyond the level of human-human interaction in order to understand how boundaries and breakdowns spread across bodies (both human and nonhuman), scales (micro and macro), and temporalities (time and space). Ultimately, inviting nonhuman actors into our analysis of interactions helps to provide a fuller understanding of how interaction is shaped by various actors at the micro-level and how these actors impact emerging possible actions.

Methodology

The Case: Two Families' Experiences with AAC Technologies

For my project research, I followed two families over the course of a year and a half as they worked to integrate AAC technologies into their daily interactions. In this introductory chapter, I present a brief overview of my research questions, methodology, and analysis process. For a more detailed description please see chapter 3. The AAC technologies that the families in my study use include software applications that can be downloaded onto an electronic device (like an iPad or tablet) and which operate by making pages with icons associated with words or phrases available for

communicators to select; selected words or phrases can then be spoken by a computerized voice. In order to identify and analyze the communication breakdown and boundary enacting practices in the families' interactions with AAC technology, I collected 10 video-recorded sessions of the parents and children interacting via AAC over the course of a year and a half. In my analysis of this interaction data, I identify children's and parents' communication strategies and consider how these strategies interface with breakdowns and fissures that arise in the families' process of learning to communicate through AAC technology. Additionally, I collected ethnographic data to explore the families' beliefs about and attitudes toward AAC use as well as their experiences with support networks surrounding AAC use through their school systems, support services, and the community organizations they interact with. This data includes two interviews—a pre-study and follow-up interview—with each parent, as well as data collected from an AAC camp attended by the families in my study aimed at educating and supporting families' efforts to incorporate AAC into their home interactions. Summer camp data include three interviews with speech language pathologists who volunteered with the camp, video-recordings of camp activities, field notes of my observations at camp, and one parent's journal entries about her experiences at the camp.

Research Questions

By identifying and exploring the challenges and communication breakdowns families face when incorporating AAC technology into their daily interactions, the larger aim of my project is to consider what these breakdowns and boundary enactments suggest for concepts of independence and agency in relation to disability and technology. Given my interest in agency as emergent in interactions of human-technology assemblages, my research questions seek to understand agency at the level of participants' micro-interactions with and through AAC. Here I briefly outline the theoretical questions my project considers.

1. How can we describe the families' interactions via AAC technologies?

- How do human and nonhuman micro-level elements of interaction shape the unfolding interaction and contribute to affording or constraining different types of action?
 - What strategies do the children and families draw on when interacting with and through the AAC technology?
 - How do participants respond to and negotiate breakdowns or boundaries that emerge in their interactions with each other and the technology?
2. What are the implications of the families' interactions for notions of agency in human-technology assemblages?
 3. What are the implications of this posthuman, interdependent approach to agency in interaction for usability research in technical communication?
 - How do embodied human-technology assemblages afford agency for users?

Methods

To address these questions, I used a mixed-methods approach combining multimodal conversation analysis (CA) of interaction sessions and ethnographic interviews and field notes to identify and explore patterns of communication breakdowns and boundary enacting practices. CA allows me to explore how breakdowns and boundaries emerge and are shaped in moment-to-moment interaction through observing the micro-level features of interaction such as gaze, body orientation, gestures, AAC screen layout and timing, to name a few. By created transcripts of the video data, I explore how these interactions are build up sequentially and how attending to the participants' responses to successive elements introduced into the interaction can shed light on their process of creating intersubjective understanding. Using these video data and transcripts I identify different challenges that the families face in their communication (communication breakdowns and boundaries) and explore how they respond to and negotiate these challenges. As this is a small case

study of two families, my goal is not to generalize the challenges each family faces to all families who use AAC. Rather, I hope to use these challenges to identify potential issues that could be explored more broadly in future research and to consider how these families' experiences might help us to rethink notions of agency and independence in interaction.

Chapter Outlines

Here I give an overview of the remaining chapters in this project, starting with Chapter 2.

Chapter 2: Theorizing Posthuman Agency and Disability in Human-Technology

Interactions

In the second chapter of my project, I lay out my study's exigency for examining agency in human-technology relations with particular attention to the importance of theories of agency for notions of disability. I draw on posthuman and new materialist theories of Bruno Latour, Jane Bennett, and Karen Barad to define and describe posthuman agency, and I explore how posthuman theories of agency have been used in disability studies and TPC scholarship to address human-technology relationships. I then consider the stakes of these definitions of agency in relation to issues of independence for people with disabilities, and particularly for children who use AAC technologies and their families. I explore how a posthuman concept of agency helps to address problems with the medical and social models of disability. Posthuman approaches to disability allow for an understanding of agency and disability that is grounded in ecologies of interactions rather than in a singular body, environment, or discourse. I argue that this approach to disabilities necessitates a critical reflection on the ways that boundaries are enacted and breakdowns occur in human-technology relations. These theories help me to explore how boundaries become productive spaces for negotiation and change.

Chapter 3: A Methodological Approach to Examining Embodied Interactions with Technologies

My third chapter considers how posthuman theories and embodiment can be used to inform my conversation analytic approach to analyzing human-technology interaction. This chapter serves to justify and establish the methodological framework that guides my data analysis in Chapters 4 and 5. As my research focuses on communication technologies for children with disabilities, I seek to understand how the micro-level focus of conversation analysis can help to reveal how boundaries are enacted and communication breakdowns occur in conversation and how these boundaries and breakdowns are negotiated. First, I employ Karen Barad's theory *agential realism* and *agential cuts* to theorize how boundary enacting practices occur in the micro-level interactions my study explores. In addition to boundary enacting practices, my methodological approach uses conversation analysis—which focuses its analytic lens at the level of utterances, gazes, gestures, sighs, body position, etc.—to provide a nuanced and detailed account of negotiated conversation that is often missing from rhetorical criticism. In sewing together threads of posthuman theory and conversation analytic methodologies, I argue that this examination has important implications for people with communication disabilities whose communication is often analyzed for its communicative competence or proximity to communicative norms (Dolmage, 2014; St. Pierre, 2015). This chapter further lays out the methodological particulars of my study, explaining the types of data I collected and my collection process, as well as providing an explanation of my analysis including examples of how I identify the instances of breakdowns, repair, boundary enactments, and communication strategies as units of analysis in my data.

Chapter 4: Interactional Fissures and Reconfigurations in Family Interactions with AAC Technologies

In Chapter 4, I employ conversation analysis to examine how breakdowns in interactions occur in the families' interaction with and through AAC technologies. I identify challenges (breakdowns and boundaries) and I investigate how various micro-level features impact and shape emerging challenges and consider participants' responses or strategies for negotiating these challenges. Additionally, I consider how the different nonhuman actors such as toys and AAC devices shape the unfolding interaction and how participants interact with and respond to these nonhuman actors.

Chapter 5: Usability of the Embodied Human-Technology Assemblage

This chapter unites concerns for inclusive and accessible technology and technical communication with posthuman approaches to usability and participatory design research. First, I explore the urgent need for research on accessible and inclusive technology and research in TPC. I then consider how posthuman views of usability help to address this need by examining how users interact with technologies in their local environments (Bellwoar, 2012; Gouge, 2016; McNely & Rivers, 2014; Rivers & Söderlund, 2016). I explore how the notion of affordance can be used under a posthuman framework to explore usability as emergent in human-technology assemblages. I then explore this approach through an analysis of a child, parent, and therapist interacting through an AAC device, attending to how moments of uncertainty or breakdown in the interaction necessitate negotiations that highlight the ways that child with complex communication needs orient to and respond to AAC technologies and their communicative partners. I argue that usability emerges from assemblages of human and nonhuman actors and that no single actors is entirely responsible for uncertainty or ambiguity. I further argue that uncertainty and breakdowns, which may seem upon first impression to be failures of usability, constitute agentive spaces where the usability of human-

technology assemblages may be reconfigured. Ultimately, to understand the usability of complex technologies like AAC devices, we have to examine usability as emergent from interactions of human-technology assemblages. When we explore usability within contexts of human-technology assemblages, we can better understand and value users' practices, and in particular, the communication strategies of children like those participating in this project who face barriers to participation in typical participatory design research.

Chapter 6: Conclusion

To conclude, I consider the implications of my analysis for notions of agency and interdependence in human-technology relations. I argue that communication technologies like AAC are better understood as elements of interactional ecologies rather than as tools or resources for singular rhetorical purposes. For people with disabilities, this theoretical shift means that technologies are not only tools and are not the source of agency or providers of independence, but rather that technologies, along with various actors help to shape interaction in unexpected ways. Consequently, to improve this interaction we need to explore relations among these various actors, and as technical communicators, we need to explore how we can reflect these networked interactions in the resources and materials we produce to guide users' experiences with technologies. The challenges that the families and children in my project research encounter when integrating AAC technologies emerge from assemblages of actors and are negotiated and reconfigured through interactions within these assemblages.

Chapter 2 : Theorizing Posthuman Agency and Disability in Human-Technology Interactions

Overview

In Chapter 1, I argued that posthuman theories of agency offer valuable ways of critiquing and rethinking normative sociomaterial practices of independence that stigmatize people with disabilities. A posthuman approach to agency is particularly important for countering discourses that position technologies alternately as saviors or as tool that rehabilitate people with disabilities. Posthuman theories counter this rhetoric by positing action and agency as emergent in collective action, rather than as the result or possession of a single rhetor or technology. In this chapter, I build on this argument to explore posthuman theories of agency in greater detail, contrasting posthuman approaches to agency with theories oriented toward social construction of agency to show the value of attending to the entanglements of social and material actors in our interactions with technology. I outline the characteristics of posthuman agency, developing a working definition of agency grounded in ecologies of interactions involving both human and technological actors. I argue that this approach to agency is important for understanding how actions and possibilities for change come about through the micro level, embodied interactions of various actors. Finally, I consider the import of this posthuman approach to agency for people with disabilities interacting with and through technologies.

Why Agency?

I start this chapter by grounding agency⁹ in disability studies concerns. For disability studies scholars and disability self-advocates and activists, the ability to be an agent and to enact change is a fundamental human right. Studying how inequalities and exclusions of people with disabilities are

⁹ In this section I refer to a broad definition of agency that incorporates notions of independence, the ability to enact change in socio-material assemblages or environments, as well as the ability to resist biased material-discursive practices that stigmatize people with disabilities. Later in this chapter I will develop a working definition of agency that I will use as a construct for my data analysis.

enacted and acknowledging the lived experiences of people with disabilities in spaces of inequality are key issues for disability studies scholars and activists. As briefly discussed in chapter 1, medical approaches and popular views of disability (see Dolmage, 2014, for a discussion of disability myths) figure disability as a lack of ability or a deficit centered in the bodies of individuals with disabilities. These medical and popular rhetorics compare the bodies of people with disabilities to idealized norms and focus on rehabilitating or normalizing disabled bodies rather than valuing bodily differences or working to change the socio-material assemblages that stigmatize differences and create exclusion (Grue & Heiberg, 2006; Moser, 2000). Rhetoric associated with the medical model of disability positions the medical industry as the agentive and authoritative in rehabilitating people with disabilities. As Oswal (2018) explains, “This medical model, no doubt, has given the chance to medical and rehabilitation professionals to accrue immense power over the disabled human body through their authority to credential certain individuals and deny others to be a rightful member of the society” (p. 7). This ideology often leads to “supercrip” narratives surrounding people who celebrated as overcome the limitations of their disability to pass as normal or surpass bodily norms (Booher, 2010; Dolmage, 2014). In contrast to this ideology, people with disability insist that disability is not something to overcome or to be erased. “Supercrip” narratives come to represent idealized standards of success which further stigmatize the many people with disabilities who do not adhere to these standards. In contrast to the medical model’s approach to disability, Oswal (2018) points out that “members of many disability groups—major organizations representing the deaf and the blind in this country, for example—see their disabilities as a part of who they are, are heavily invested in this identity category, and are not necessarily interested in wasting their life looking for cures for their impairments” (p. 7).

For disability studies scholars and disability activists, notions of agency have been central to challenging the stigmatizing portrayals of people with disabilities as passive and in need of being

cured or controlled. Exploring issues of agency has helped disability scholars to challenge and reconceptualize negative historical portrayals of people with disabilities (Dolmage, 2014), and examine the ways that society and material environments limit the actions of people with disabilities who do not fit into the social/material enactments of bodily norms (Garland-Thomson, 2011). Disability studies scholars have sought to introduce challenge the notion of agency as independence by examining the different ways that people with disabilities enact change in their environments and relationships (Al Zidjaly, 2015), and by also exploring the networks of actors that hinder or help to create change (Moser, 2000). Drawing on these disability studies conversations, in this project I explore the intersections of disabilities, technology, and agency and their import for theorizing human-technology relationships and for considering the role of technical communication scholarship in working alongside people with disabilities to challenge ableist ideologies of agency, independence, and technology.

Defining Technology

Technologies are the site of much discussion about agency for people with disabilities. As discussed in chapter 1, corporate and popular discourses surrounding technologies promote the view that technologies provide greater independence—and thus agency—for people with disabilities. For example, Moser (2006) explores the experiences of a man with quadriplegia whose house was converted into a “smart house” to allow him to live more independently. Moser observes that while it appears that people are made more independent through technologies, when we integrate technologies in our networks, we are entering into interdependences. In particular, many people with disabilities who are often stigmatized or socially ostracized by rhetoric and policies that frame them as helpless or passive have worked to gain more control over decision making surrounding technologies in their lives (Al Zidjaly, 2015; Kröger, 2009, p. 405). At stake in notions of independence are understandings of both identities of people with disabilities and their embodied

experiences interacting with and through technology. Disability study scholars have argued that the rhetoric surrounding assistive technologies¹⁰ often positions the use of technologies by people with disabilities as rehabilitative—as aiming towards the creation of a “normal” body or ability (Moser, 2000). These scholars point out that other mediated human experiences and uses of technologies do not receive the same diminutive position as technologies used by people with disabilities do. Foley and Ferri (2012) write that “assistive technology perpetuates a myth of independence that has been critiqued by disability rights activists and scholars, who argue that perceiving disabled people as dependent obscures the myriad ways that all people are interdependent on one another and on technology” (p. 193). The complex ideologies and disability myths that frame technology use by people with disabilities coupled with the lived experiences of individuals with disabilities interacting with technologies makes agency in human-technology relationships for people with disabilities a difficult yet important issue to grapple with.

Before I continue further with a discussion of agency, I would like to develop a definition of technology grounded in TPC and the Science and Technology Studies (STS) literature. Lynch and Kinsella (2013) point out that the term *technology*, like *rhetoric*, is associated with invention: “each results from the gathering and deployment of existing resources, whether these are the scientific principles or material foundations that become the basis for a specific device or the ideas and arguments that form the basis for a finished discourse” (p. 1). Here, Lynch and Kinsella argue that the creation of a new system for action through the manipulation and gathering of prior resources constitutes an understanding of technology that is more than just a product or device. This definition of technology identifies development, dissemination, and use as important components of

¹⁰ Assistive technologies are considered any type of technology that helps a person to do activities that are considered “norm” for able-bodied people. Disability studies scholars resist this terminology because it is based on a medical or rehabilitative model of disability that focuses on identifying differences between idealized bodies.

technological objects. Thus, while rhetoricians often refer to technologies as the specific objects or artifacts they are studying, they conceive of technologies as complex enactments of human social interests, discourses, and material affordances and constraints. Bazerman (1998) writes that “technology as a human-made object, has always been part of human needs, desires, values, and evaluations, articulated in language and at the very heart of rhetoric” (p. 383). This nuanced definition of technology emphasizes the ways that objects or technologies are the results of material-discursive interactions. Defining technology as a material-discursive object allows for a wide range of entities such as texts, organizational frameworks, electronic devices, communication strategies, and other complex systems to be considered technologies.

Beyond discrete objects or artifact, rhetoricians have also recognized technology as a broader system or network. Lynch and Kinsella’s (2013) argue that technology broadly defined can be thought of as “a way of life”. On this view, technology is part of socio-cultural systems of power. The development of technological objects is shaped by material-discursive practices, and through use, technological objects also come to reinforce or shape social behaviors (Clark, 2010). Lynch and Kinsella write, “in order to succeed, a technology and a rhetoric of technology will involve the transformation of multiple aspects of our social milieu” (p. 2). In other words, technologies are not merely discrete objects; their functionality and success are bound up in social and material relations.

Actor Network Theory scholars take a similar approach to examining technologies as networks and as products of networks. Within an ANT framework, technology is constituted by bringing together and manipulating many different socio-material components so that these components or actors work together toward achieving the same goal (Latour, 1991). An example of this notion of technology can be seen in Graham’s (2009) exploration of the ways that PET scans became a fundamental component in the medical community’s acceptance and legitimation of the disease fibromyalgia. Graham found that PET had a crucial role in creating a network of

fibromyalgia, which once established, became a stable system of material-discursive practices aimed at addressing through diagnosis, research, and treatments the pain experienced by people with fibromyalgia. In other words, once PET scans were used to enact properties of fibromyalgia, these enactments legitimized the disease in the medical community and came to participate in the development of a host of social-material practices to address fibromyalgia. As a stable system in the medical field, the Fibromyalgia network is *a technology* enacting certain views of and practices targeted toward the disease, its diagnosis and treatments.

For this project, the technologies that I primarily focus on are augmentative and alternative communication devices (AAC). As previously mentioned, these electronic devices include software on iPads or tablets that allow users who have complex communication needs (CCNs) and have limited ability to produce vocal speech to select icons associated with words or phrases on touch screens that are then produced by the device's electronic voice. AAC devices are discrete objects, yet they are shaped by a host of social, cultural, economic, and material factors and actors such as theories of language use and acquisition, economic concerns, navigation and organization of the software, and many more factors. While I often refer to AAC devices as discrete objects, I acknowledge and try to draw on the complex material-discursive factors that inhabit these devices' networks. Moreover, I explore the ways that these discrete artifacts become part of or fail to be integrated into larger networks of interaction in communication between parents and their children who use AAC devices. In this sense, I explore how boarder technologies or systems of interaction emerge through families' use of AAC technologies.

Since both technology as systems and technology as discrete artifacts are theorized to profoundly impact human life and behavior, scholars studying human-technology relationships are interested in examining the extent to which individuals and collectives can impact and change the ways that technologies are developed, disseminated, and used. Lynch and Kinsella figure agency as a

significant concern of rhetoricians of technology, arguing that such scholars should study “the choices that we have made during the creation and dissemination of any given technology, which we can hopefully revise or redesign” (Lynch & Kinsella, 2013, p. 4). In addition to developers’ agency, rhetoricians study the ways that users impact technological development and use. This project concerns the ways that families use AAC technologies, the ways that agency is distributed in these interactions, and implications of these interactions for notions of usability (discussed in the fifth chapter of this project). Building from this definition of technology, in the next section, I turn to a discussion of theories of agency in relation to human-technology interactions.

Rhetorics of Technology and User Empowerment

As technologies are becoming increasingly integrated into new areas of life (Bazerman, 1998; Moses & Katz, 2006), scholars working in TPC and the closely related field of rhetoric have heeded the call to theorize and define agency in human-technology relationships in order to better understand the consequences of our intimate relationships with technologies. This scholarship highlights the ways that technologies are both influenced by culture and come to influence culture (Bazerman, 1998; Clark, 2010; Lynch & Kinsella, 2013; Scott, Longo, & Wills, 2006). Not only does culture influence technological development so that technologies are never neutral or isolated from culture, but technologies also influence and change social organization and interaction (Clark, 2010). Bazerman (1998) highlights technologies’ potentials to shape social life:

The rhetoric of technology shows how the objects of the built environment become part of our systems of goals, values, and meaning, part of our articulated interests, struggles, and activities...The changed conditions of life made possible by the introductions of new technology create new realms of discussion as we try to figure out what these changed conditions mean, what problems they pose, and what we can accomplish within them. (p. 386)

Here Bazerman claims that technologies become entrenched in our ways of knowing and understanding the world. They become part of our epistemology. For Bazerman, this epistemology is negotiated and subject to revision through discussion and intervention—learning how we can adapt to new conditions created by technologies and how we can use those conditions to our benefit. He argues that “by picking apart the construction of the powerful discursive forces that create value for and give shape to technological developments and their uses, we can begin to regain some choice about the technological future we live in” (p. 387).

Bazerman’s previous point, the possibility of human intervention, is one of the most perplexing problems for rhetoricians of technology theorizing agency and change in human-technology relationships. Because culture and technology included many complex variables and are inseparably intertwined, the implications of this relationship for technological users and agency is difficult to isolate and understand. Central to this problem is the extent to which cultural forces and/or technological forms constrain or enable technology users’ capacities to shape the material-discursive practices that technologies are integrated into, as well as their abilities to influence the process of technological development, dissemination, and use (Lynch & Kinsella, 2013). The view that technology and the larger ideologies that it emerges from determines or controls its use and users is technological determinism. Drawing on John Staudenmaier’s definition of technological determinism, Johnson (1998) writes that,

Technological determinism...places agency in the hands of a broadly defined technology.

That is, technology is more than artifacts or systems in this definition and also includes economies, notions of “progress”, and narrative constructions of the success of technology in the modern world; many facets of human intellectual and material life, that is, have aided in the construction of technological determinism. (p. 87)

According to Johnson (1998), a technological determinist position views technologies as entrenched in complex systems of discursive-material practices. Johnson argues, “Technologies have a strong and defining influence upon whole complexes of cultural shifts that make the problem of locating agency difficult” (p. 87). While most rhetoricians and TPC scholars reject strong interpretations of technological determinism, they acknowledge the powerful discursive-material practices surrounding technology and their impact on human life (Johnson, 1998; Scott et al., 2006). Cultural Studies theorists like Scott et al. (2006) see technologies as embedded in powerful cultural ideologies that can “disable as well as enable, exclude as well as include, delegitimate knowledge as well as legitimate it” (p. 13). Much TPC literature has been motivated by concerns that technologies developed for profit often impose oppressive material-discursive practices on users (Scott et al., 2006).

Rhetoricians and TPC scholars wishing to act ethically, have critically considered these fields’ roles in promoting these discourses and ways that they might resist oppressive elements of the material-discursive practices surrounding technologies. These scholars explore the ways that technical communicators may use the material-discursive practices of TPC in social change and user empowerment.

TPC scholars have a rich history of critical approaches to agency in the rhetorical practices technical communicators engage in (Browning & Cagle, 2017; Katz, 1992; Scott et al., 2006). As mediators among industry, technologies, and the public, TPC as a field has long been interested in questions of agency for end-users and in critiquing and improving the ways that the technical communication addresses the complex and diverse needs of users (Browning & Cagle, 2017). These critical rhetorical approaches to technical communication allow scholars to examine “technical communication’s roles in hegemonic power relations” and to think about how technical communication scholars and practitioners may intervene in these power relations in order to help inform and empower the public and, in particular, technology users who may be negatively impacted

by the hyperpragmatic discursive-material practices that prioritize market logics at the expense of users' needs (Scott et al., 2006, p.1). Scott et al. (2006) define hyperpragmatism as “a hegemonic ideology and set of practices that privileges utilitarian efficiency and effectiveness, at the expense of sustained reflection, critique, or ethical action” (p. 9). Hyperpragmatic approaches seek to prioritize quick technical solutions at the expense of structural change and transformation. As Scott et al. (2006) note, “the goals of hyperpragmatism are conformity, expediency, and success, narrowly defined” (p. 13). Scott et al.'s (2006) critique of hyperpragmatism is closely aligned with disability studies critiques of rhetoric that positions technology as a savior or tool for the rehabilitation of people with disabilities. Motivated by technocapitalist ideologies which position technology as the solutions to complex social problems, hyperpragmatism in contexts of disabilities takes the form of finding the narrowest technical solution to the social-material exclusions that people with disabilities face when interacting in an ableist world. This hyperpragmaticism poses a particular danger to people with disabilities whose diverse needs can often not be met by reductive and hyperpragmatic approaches to technological development. Under a technocapitalist paradigm, these narrow technical solutions are geared toward the profit of technology companies rather than user needs. Issues of agency in human-technology relationships are foundational for understanding and evaluating the role of technologies in relation to notions of independence for people with disabilities as well as for understanding and confronting hyperpragmatic practices in technology development, dissemination, and use.

Approaches to Agency

Given the complexity of human-technology relationships, agency is a difficult concept to pin down and there are many variations, overlaps, and divergences in accounts of agency. In order to develop a working definition of agency in relation to technology and disability, I turn in this section to a review of relevant scholarship on rhetoric of technology in the fields of TPC and STS.

STS scholars such as Latour, Barad, and Bennett have provided broad theoretical discussions of agency in relation to technologies which TPC scholars have in turn applied to consider agency in relation to technical communicators and technology users. In my discussion below, I am particularly interested in understanding agency in interaction through several questions: (1) who or what can take part in agentic actions, and (2) how is agency distributed among such actors? To consider these questions, I will explore approaches to agency in the fields of rhetoric and TPC that figure agency in relation to structures of power (Koerber, 2000, 2006; Scott et al., 2006) as well as post-humanist approaches that theorize agency as emergent in interactions among technologies and humans (Barad, 2003; Bennett, 2010; Graham, 2009; Latour, 1991, 2005; Mara & Hawk, 2010). These posthuman theories help to situate agency within networks and within interaction, a crucial element of this project research as I explore how micro-features of interaction shape possibilities for action. Ultimately, I adopt a posthuman account of agency and argue that this approach allows me to explore the how embodied interactions lead to opportunities for further action and how unexpected and unintended outcomes of human-technology interactions shape and constrain these opportunities.

A General Definition of Agency

I would like to start this discussion with Graham's (2009) general definition of agency. Graham (2009) describes agency as a "change in the status quo" that comes about from "series of rhetorical events" (p. 379-380). Following Herndl and Licona (2007) he notes that actions or programs are often constituted by their opposition to "authoritative forces", and that we can observe that when a change occurs, it requires "new authoritative forces" to maintain its position as a stable state (p. 379-380). Working with Graham's general definition of agency, if we return to the definition of technology I outlined earlier in this chapter that recognizes the presence of technology

in human life as both systems and as discrete objects, we can broadly define agency as changes in the status quo ways that technological systems or objects are developed, disseminated, or used.

Agency in a Social Constructionist Paradigm

In cultural studies approaches, agency is often cast in relation to power or authority. Scott et al. (2006) describe authority as “discursive-material practices that are situated in concrete but dynamic sociohistorical formations, that participate in ideological struggles over knowledge legitimation, and that help shape identities” (p. 5). Agency in relation to ideological power structures takes the form of resistance to the ways of knowing or doing that such structures enact. TPC scholars who follow this approach to agency are interested in understanding the role of technical communicators in intervening in the hegemonic discourses, particularly “hyperpragmatism” and ideologies of “ease” or “expediency” surrounding the production, dissemination, and use of technology (Dilger, in Scott et al., 2006; Katz, 1992; Slack, Miller, and Doak also in Scott et al., 2006). These authors contend that technical communicators and researchers working in this field have the civic responsibility to practice and teach resistance to repressive and productive “hyperpragmatic” pressures in technical communication. Although they do not use the term *agency* directly, Scott et al. (2006) argue that technical communicators’ have the power to intervene through their “use and control of language” (p. 24). They want to make apparent the cultural ideologies that technological practices are rooted in, and to denaturalize these practices in order to give users more opportunities to interact with technologies in ways that resist the hyperpragmatic and expedient values that stem from unjust economic practices.

Scholars taking a rhetorical approach to agency are additionally concerned with understanding users’ interactions with technology and user empowerment. Amy Koerber (2000), a feminist rhetorician of technology, describes a trend in traditional rhetorical approaches to

technology that prioritizes design over use. She writes that feminist approaches to the rhetoric of technology can challenge this inclination by examining the consequences of technology on users:

We might look at a new technology during its design and development phase and think that it will speak a truth about gender that will be potentially liberating, but once this technology begins to be used, it ends up saying something quite different from what we predict. The reason is that after technologies are designed, produced, and marketed, they are typically incorporated into existing institutions and practices, which cause them to reinforce status-quo meanings of phenomena such as race and gender rather than fostering new meanings (p. 68).

Here Koerber argues that even technologies which might appear to have potential to liberate users often end-up reifying dominant ideologies that repress users' abilities of self-expression. Koerber's observation corresponds to concerns raised by disability studies scholars regarding the ways technology design fails to account for the perspectives and lived experiences of people with disability interacting with technologies.

For scholars of rhetoric, one means of enacting agency in human-technology relationships is to create alternative discursive-material practices that resist or interfere with these hegemonic ideologies. Hallenbeck (2012) offers an example of this type of interference in her exploration of women bicycle users in the 19th Century. She conducted an archival comparison of bicycle manuals produced by manufacturers and literature produced by women riders themselves. The manufacturers' manuals instructed women to ride with "a trusted male companion"; to use bicyclical riding as a means of "mild" exercise in order to gain more strength for household responsibilities; and not to worry about the technical upkeep of the bicycle (p. 294). In contrast to the manufacturers' instructions, Hallenbeck found that female bicycle users produced their own guides and literature

that helped promote technical knowledge of bicycle maintenance and also positioned the bicycle as a personal hobby rather than an aid to housework.

These scholars discussed above engage with agency through discourse and ideology, examining the ways that dominant social formations constrain views and uses of technology, and how these formations can be resisted and revised through material-discursive intervention. These approaches locate agency in the struggles that marginalized individuals and communities face in resisting hegemonic discourses surrounding technologies (Scott et al., 2006). Thus, on this social constructionist view, agency can be defined as opportunities to resist the negative dominant ideologies that underlie much of material-discursive practices surrounding technologies. Issues of participation in technology design and decision making are of paramount importance in the field of disability studies scholars and to disability studies activists, whose familiar motto is “nothing about us without us”.

Rhetorical approaches to agency recognize technologies’ participation in the dynamic relationship between authority and agency (Herndl & Licona, 2007) by examining the ways that technologies reflect the ideologies that helped to create them. Koerber (2000) notes that “feminist critiques point toward a rhetoric of technology that allows technologies themselves to be viewed as potential discursive agents rather than strictly as objects about which people produce discourse” (p. 66). On this view, we can understand the rhetorical powers of technologies as reifying discourses of authority as well as in having the potential to challenge such discourses. Much of the social construction oriented scholarship figures agency as opportunities to enact change through material-discursive practices in social relations and focuses on the ways that end-users or marginalized communities take part in enacting change. Scholars who favor this approach tend to prioritize the contributions or agency of humans in creating change. For example, in her discussion of automated writing assessment systems Miller (2007) is equivocal regarding the possibility of agency for

nonhumans. She ultimately suggests that we could “delegate” agency to nonhumans as we see fit, but that we should be cautious in our attributions of agency as careless attributions have the potential to harness machines’ agency for the benefit of dominant socio-economic powers. Miller is hesitant to attribute the capacity to act to nonhumans because she suggests that nonhuman entities are liable to be co-opted by dominant socioeconomic ideologies, such as the previously discussed value of hyperpragmatism (Scott et al., 2006) or the medical model of disability. This concern is also reflected in Koerber’s observation that technologies that are heralded as liberating may come to constrain users by re-enacting status quo notions of gender, race, class, and ability. Although these scholars acknowledge that marginalized individuals or groups may use technologies in creative ways that subvert the authoritative material-discursive practices in which technologies are enmeshed, these scholars are also concerned with the alacrity by which these technologies may be mobilized to reinforce oppressive authoritative rhetorics. These concerns mirror Tucker’s (2017) critiques of popular and commercial rhetoric that position technology as saviors for people with disabilities. These theories highlight critical concerns for issues of agency in human-technology relationships that must be accounted for if agency is shifted from a social to a sociomaterial paradigm. In other words, these concerns highlight the caution that should be brought to approaches that uncritically extend agency to nonhuman actors such as technologies.

Social Approaches to Disability

In the disability rights movement, scholars and activists have used social construction approaches to show how disability is not simply a deficit in the bodies of individuals, but rather a problem of societies and environments that create disabling circumstances for people. Like the social construction approaches to agency outlined above, social construction in relation to disability emphasizes struggles between individuals and larger ideological forces that shape how disability is defined and practiced. The social constructionist approach to disability was a response to the

stigmatizations and normalizing ideologies brought on by medical models of disability which sought to normalize and rehabilitate disabled people. These technological and medically oriented discursive-material practices have been critiqued on several bases. For example, the medical model posits that Autism is a “deficiency” or “problem”, but self-advocates and activists in the Autism community argue that Autism is a culturally stigmatized neurocognitive difference (Walker, 2013). By locating disability as deficits in the bodies of individuals, the medical model fails to account for the factors that come together to create conditions of exclusion, instead focusing on physical and mental deviations from an imaginary norm. Consequently, the medical or individual model isolates a person in a personal program of rehabilitation aimed at normalization, hindering individuals’ possibilities for collective identity building, organization, and advocacy, and positioning persons with disabilities as responsible for adapting to norms as they are accountable for the “deficiency” in their bodies.

As the disability rights movement gained momentum in the latter half of the 20th century, disability scholars and activists contested medical and rehabilitative models of disability, reasoning instead that disability was a social construction (Shakespeare, 2013). On this view, it was society that was responsible for creating disability and exclusions. Socially created discursive-material practices were seen to enable or disable individuals as they encountered different social and environmental situations. Thus, rather than “rehabilitating” individuals with disabilities, the politics of the social model aligned with the civil rights movements, insisting that governments and societies are responsible for ensuring rights of equal social participation in society by removing barriers to participation in the social and material environment (Shakespeare, 2013). As Tucker (2017) points out, insisting on the agency of people with disabilities in overcoming oppressive and marginalizing sociomaterial practices has been a fundamental tenant of the disability rights movement because it pushes back against these rhetorics that position people with disabilities as passive and helpless.

Critiques of Social Approaches to Agency

Social-constructionist oriented views of action and agency have been formidable in exploring the effect of dominant ideologies and power structures on the lives of people with disabilities. This approach has also highlighted the creative ways that people deal with ideologies that impose certain class, race, gender, and ability positions. However, scholars following posthuman theories argue that prioritizing social structures as the dominate force shaping both social and material realities misrepresents a large portion of entities that impact action and neglects to explore processes of acting and becoming that constitute agency. As Bennett expresses this, the social constructionist view of nonhuman entities as passive tools or blank slates for social ideologies to inhabit fails to consider the vitality of materials. Bennett argues that objects are “vivid entities not entirely reducible to the contexts in which (human) subjects set them, never entirely exhausted by their semiotics” (p. 5). Latour, Bennett, and other posthuman scholars insist on the capacity of nonhuman entities to affect the world beyond the intention or control of human institutions or individuals. Latour (2005) further argues, that social constructionist approaches which separates the social from all other areas of life are problematic because they cannot adequately account for how the social relates to or interacts with other domains or forces in life. In other words, the tendency in sociology to try to explain events or phenomena by appealing to dominant social structures whose existence is assumed from the start misses the process of interaction by which such events come about and leaves out many other elements that contribute to actions. The crux of Latour’s critique of social constructionist approaches is that these approaches, according to Latour, fail to trace actions back to an explanation and rather try to impose social explanations on the phenomena they study (p. 7-8). He argues that social constructionist accounts prioritize the stable social constructs in their explanations at the cost of exploring the emergent qualities or action and agency. In contrast to this approach to sociology, Latour (2005) contends that the term *social* can be alternatively defined as

associations of various human and nonhuman elements. He defines the social as “a very peculiar movement of re-association and reassembling” (Latour, 2005, p. 7). Under this posthuman paradigm, the work of sociologists is to trace the continuous reassembly of connections between actors in order to understand how actions occur.

Likewise, critics of the social constructionist approach to disability have argued that the strong interpretation of the social model of disability ignores the embodied experience of people with disabilities. In the social model, agency is gained through identity creation, collective organization and control of the rhetoric surrounding disability (Watson, 2005). The social model positions people with disabilities in a struggle for agency with larger hegemonic power structures and ideologies of normalization. One primary factor in promoting agency under this account is technology and the built environment. Galis (2011) notes that the social model’s insistence that modification of the built environment would erase disability led to a sort of technological determinism which took technology as a neutral tool for providing agency to people with disabilities. Galis writes: “This initial social approach of disability lacked a critical link between bodily experiences of disability, the development of social policies and the configuration of technology (and the built environment)” (p. 828). According to Galis, the social model of disability, with its emphasis on the social construction of disability, lacked knowledge on the interworking of both the social and the material conditions that contribute to disability. Likewise, Shakespeare (2013) writes, “Whereas other socio-political accounts of disability have developed the important insight that people with impairments are disabled by society as well as their bodies, the social model suggests that people are disabled by society not by their bodies” (p. 218). The social model of disability implies that disability will be erased if all social and environmental barriers are abolished. Although it is clear that barriers that hinder people with disabilities from participating in society should be removed, critics have

pointed out that even with the removal of the barriers, the bodily conditions of disability remain to create differences that should be acknowledged and accounted for.

In light of these critiques of the social constructionist approaches to disability, it is not surprising that many disability advocates and scholars have turned to posthumanism in order to gain a better understanding of the embodied experiences of disability and how disability and ability are enacted through the interaction of both social and material factors. This intersection between the social and the material has been explored by disability studies scholars working from a posthuman perspective (Galis, 2011; Gibson, 2006; Gibson et al., 2012; Moser, 2000, 2006, 2010). These authors argue that perspectives of disability could be enhanced by greater attention to the embodied experiences of living with and through technology and the tensions in agency that these experiences reveal.

Posthuman Agency

In this section, I present posthuman theory as a means of uniting the social and material by exploring agency as it emerges in interactions among diverse human and nonhuman actors. Posthumanism has been fundamental in helping TPC scholars interrogate our complex interwoven relationships with technology. For TPC scholarship concerned with technology and disability, I argue that posthumanism offers a better account the complex embodied relations people with disabilities experience with technology and the world. Much of the inspiration for posthuman approaches to agency in TPC literature come from Bruno Latour, John Law, and Michael Callon's work on Actor Network Theory, and from new materialist thinkers like Donna Haraway, Karen Barad, and Jane Bennett in the fields of science and technology studies, philosophy, and political science. Drawing on this scholarship, I create a general definition of distributive, posthuman agency, outlining its characteristics and exploring the value of this approach to agency in contexts of disability. I conclude this section by considering how posthuman theories can be used to address the

challenge this project explores—how to help families whose children have communication disabilities integrate AAC technologies into their daily interactions.

Recently, TPC scholars have been interested in the ways that nonhuman entities, such as technologies and texts, may participate in affecting change (Moore & Richards, 2018). According to Mara and Hawk (2010), “*Posthumanism* is a general category for theories and methodologies that situate acts and texts in the complex interplays among human intentions, organizational discourses, biological trajectories, and technological possibilities” (p. 3). Mara and Hawk note that posthuman approaches to understanding human-technology relations take a middle ground between the humanist focus on human agency and technological determinism—the view that technologies inhibit human freedom or ability to act. Rather, posthuman theory explores how humans and nonhuman interact within complex systems or networks of relations where the joint actions that emerge from these relations make change or agency possible. The stimulus for the concern with nonhuman entities stems from the argument that action is never the propriety of a single actor or under the control of human intention, but neither is it completely dominated by an outside material, structure, or authority. Rather, action—and hence agency or the capacity for change in the status quo—comes about as a result of the coming together of many heterogeneous actors. As Latour (2005) argues in *Reassembling the Social*, “Action is not done under the full control of consciousness; action should rather be felt as a node, a knot, and a conglomerate of many surprising sets of agencies that have to be slowly disentangled” (p. 44). Posthuman scholars like Latour, Bennett, and Barad critique the emphasis that the humanities and social sciences have placed on human individuals or human social structures in driving and constraining action.

Distribution

These theories raise questions regarding agency’s production and location asking whether agency is located within individuals or collectives or distributed across networks of actants? To

understand these questions, it is first helpful to look at how Latour defines actants and collectives.

For Latour, an actant is any entity, human or non, that may impact or act upon another entity.

However, actants are not necessarily individuals, as even actants that appear to function as single entities are always collections of complex and heterogeneous components either working together to maintain a stable state or interacting in a state of change. Latour (1991) explains

Innovations show us that we never work in a world filled with actors to which fixed contours may be granted. It is not merely that their degree of attachment to a statement varies; their competence, and even their definition, can be transformed. These transformations undergone by actors are of crucial importance to us when we follow innovations, because they reveal that the unified actor...is itself an association made up of elements which can be redistributed (p.109).

For Latour, there is no fixed, stable agent who acts with or against dominant discourses as in social construction models of agency. Instead agency is dispersed among actors in a network. Through the network approach to agency, it is not necessary to ask whether technology controls humans or humans technology; rather we should ask how technologies and humans act together in networks to create certain effects or possibilities (McNely & Rivers, 2014). Posthuman approaches to human-technology relationships do not create an either/or condition for agency placing agency either solely in the domain of human social actions, determinative power structures, or technologies (Mara & Hawk, 2010). Rather, technologies and humans mutually impact each other through interactions within networks or systems of relation. Latour (2005) further explains that Actor Network Theory (ANT) “is not the empty claim that objects do things ‘instead’ of human actors: it simply says that no science of the social can even begin if the question of who and what participates in the action is not first of all thoroughly explored, even though it might mean letting elements in which, for lack of a better term, we would call *nonhumans*” (p.72).

But what does it mean to say that agency is distributed (Latour) or distributive (Bennett) across heterogeneous actors? Distributed agency suggests that, as Latour (1991) argues, both human and nonhumans never act in isolation. Action comes about through associations and alliances among actants so that the relations among actants shape the action. Bennett (2010) further explores the notion of “distributive” agency through the notion of cause and effect. In many human-oriented accounts of agency, agency depends on human will and intention as impetus for a cause and effect relationship. This notion reinforces the subject/object divide of the agentive doer and the passive object of that action. Bennett argues that “A theory of distributive agency...does not posit a subject as the root cause of an effect. There are instead always a swarm of vitalities at play. The task becomes to identify the contour of the swarm and the kind of relations that obtain between its bits” (p. 32). The implications of this shift in focus from an agentive subject responsible for action to a distributive agency in an assemblage of dynamic actants, indicates shared responsibility as well¹¹. However, Bennett (2010) notes that assemblages have “uneven topographies, because some of the points at which the various affects and bodies cross paths are more heavily trafficked than others, and so power is not distributed equally across its surface” (p. 24). Latour (1991) hints at this inequality as well when he writes that there are always actants that are excluded or left out of certain configurations of a network or assemblage. Thus, distributed agency implies collective action that results from interaction among actants; it also suggests that access to interaction in networks impacts certain actants’ capacity to participate in and benefit from actions or the agency made available through interactions in assemblages.

¹¹ Shared responsibility is a key argument in understanding posthuman agency. This position has its strengths and weaknesses in terms of its potential effects on how disability is enacted in relation to technology use. I will discuss these concerns later in this chapter.

Emergence

An important insight of posthuman, distributive approaches to agency is their emphasis on the emergent characteristics of assemblages and of agency. On posthuman theory, actants impact each other as they come together in assemblages, creating opportunities for the relationships within an assemblage to change. Latour writes that in this process of alliance and substitution, “groups are constantly being performed and...agencies are ‘ceaselessly’ debated” (p. 63). In other words, agency, or the capacity for change arises out of the interaction of actants in assemblages, making and remaking their relationships. Posthuman approaches to agency see actors and interaction as engaging in constant co-evolution—or change in relation to ongoing relationships. Latour suggests that context, audience, and content (or technological products) develop simultaneously: “Contrary to the claims of those who want to hold either the state of technology or that of society constant, it is possible to consider a path of an innovation in which *all the actors* co-evolve in networks of interaction” (p. 117). Here, Latour also denies the possibility of an essential or fixed society or technology that could determine the outcomes of networks or the potential paths that actants may take. Thus, actors are themselves being constantly redefined and remade through their ongoing relationships. Likewise, Bennett (2010) describes emergent agency as a property of actants and of assemblages:

The effects generated by an assemblage are, rather, emergent properties, emergent in that their ability to make something happen...is distinct from the sum of the vital force of each materiality considered alone. Each member and proto-member of the assemblage has a certain vital force, but there is also an effectivity proper to the grouping as such: an agency *of* the assemblage” (p. 24).

The agency of the assemblage emerges from interactions among agents within the assemblage, meaning that agency is characterized by its moment-to-moment constitution within relations.

Bennett explains that the relations among members of assemblages require maintenance. She argues

This maintenance is not a process of mere repetition of the same, for it entails continual invention: because each mode suffers the actions on it by other modes, actions that disrupt the relations of movement and rest characterizing each mode, every mode, if it is to persist, must seek new encounters to creatively compensate for the alterations or affections it suffers. What it means to be a ‘mode,’ then, is to form alliances and enter assemblages: it is to mod(e)ify and be modified by others (p. 22).

Agency is emergent in that it results from the ongoing, iterative relations in which actors are constantly impacting each other. This suggests that actors’ interaction with each other always bring about different potential relations and opportunities for action—or agency as I define it in this project. These interactions enable some possibilities and constrain others.

Barad’s (2003) theory of agential realism is particularly helpful in further exploring the emergence of agency in relations. According to Barad, agency is not a possession or an attribute of individual entities (this differs from Bennett’s take on agency quoted above). Barad’s claim is not that nonhumans too have agency, but rather that agency arises out of *intra-actions* or *agential cuts*.

Theorizing agency as the result of iterative intra-actions makes agency emergent through relations, not existing prior to them. As Barad puts it,

Agency is a matter of intra-acting; it is an enactment, not something that someone or something has. Agency cannot be designated as an attribute of ‘subjects’ or ‘objects’ (as they do not preexist as such). Agency is not an attribute whatsoever—it is ‘doing’/‘being’ in its intra-activity. Agency is the enactment of iterative changes to particular practices through the dynamics of intra-activity. Agency is about the possibilities and accountability entailed in

reconfiguring material-discursive apparatuses of bodily production, including the boundary articulations and exclusions that are marked by those practices in the enactment of a causal structure. Particular possibilities for acting exist at every moment, and these changing possibilities entail a responsibility to intervene in the world's becoming, to contest and rework what matters and what is excluded from mattering" (p. 827).

For Barad, discrete entities as we usually conceived of them (humans, technologies, subjects, objects, etc.) do not have particular inherent characteristics or qualities apart from their intra-actions or their relations with the world. This is similar to Latour's (1991) assertion that actants take on their characteristics from their relations within an assemblage or a network. Furthermore, Barad, like other posthuman theorists, seeks to break down distinctions between humans and nonhumans and between the social and the material world by uniting these concepts under a boarder definition of materiality. Barad argues that "matter is substance in its intra-active becoming—not a thing but a doing, a congealing of agency" (p. 828). Entities become distinguished from one another when they intra-act in locally defined parameters, and agency arises from these intra-actions as the parameters (or *apparatus* in Barad's terminology) may always be reconfigured, re-enacted, reconstituted, offering new possibilities and limiting others. Barad chooses the term *intra-actions* over *inter-actions* to emphasize that inherent distinctions such as human/nonhuman, subject/object, material/social, and nature/culture do not exist because neither side of these dichotomies is able to claim an exteriority or prior existence to their intra-actions. Rather, intra-action denotes that actions are taking place within a phenomenon or an assemblage—not due to manipulation from an exterior force but due to relations of mutually constitutive matter bringing new possibilities into being and constraining other possibilities through their intra-actions. For Barad, agency is the "possibilities for acting" brought about by material-discursive practices that divide or create "agential cuts" in an assemblage—marking boundaries within a phenomenon. Barad theorizes that these cuts enact boundaries that are

“local resolutions within phenomena” (p. 815). These boundaries are local and particular to relations of specific assemblages or actors—not bound to exterior power structures or states of actors.

Theories of emergent agency resonate with Anne-Marie Mol’s theory of multiple ontologies. Mol (2003) argues that objects are best understood through examining how they are enacted in practices, rather than in assessing perspectives. In other words, doing, or practices constitute actors and their relations. According to Mol (2003), “objects come into being—and disappear—with the practices in which they are manipulated. And since the object of manipulation tends to differ from one practice to another, reality multiplies” (p. 5). For Mol, ontology, rather than epistemology, is multiple according to the many ways that objects—such as the bodies, patients, diseases, doctors, technicians, and technologies in Mol’s research—are enacted in daily practices. In Mol’s theory, ontology is *emergent* through interactions. Mol argues “*Ontology* is not given in the order of things...instead, *ontologies* are brought into being, sustained, or allowed to wither away in common, day-to-day, sociomaterial practices” (p. 6). Mol argues that in order to examine the multiple ontologies or enactments of objects, researchers should explore the daily sociomaterial practices such objects are involved in.

Theorizing agency as emergent is particularly important for understanding the interactional data I examine in my research. The agency of the assemblage emerges from interactions among agents within the assemblage, meaning that agency is characterized by its moment-to-moment constitution within relations. This suggests that actors’ interactions with each other always bring about different potential relations and opportunities for action—or agency. These interactions enable some possibilities and constrain others (Rose & Walton, 2018). Thus, to understand how families come to act together with AAC technologies, I examine the moment-to-moment unfolding of their interactions and consider how different configurations of the local assemblages they interact

within come to create certain opportunities for action and limit others. I discuss my methodology for examining interactions in greater detail in chapter 3.

Uncertainty

Theorizing agency as distributed and emergent has important implications for the kind of phenomena that researchers interested in change and agency should explore. Latour (2005) argues that change or emergence, rather than stability, is the typical state of networks. As such, to understand how stability within networks is created researchers should explore uncertainties. Latour asserts that many of the phenomena that social scientists take as closed cases (the nature of groups, action, objects, facts, and social science research) are rife with uncertainties that need to be investigated. He explains that “instead of taking a reasonable position and imposing some order beforehand”, social scientists following ANT should “be able to find order much better *after* having let the actors deploy the full range of controversies in which they are immersed” (p. 23). In other words, the work of social scientists should not be to fit actors into pre-determined categories or to preside over and pass judgement on controversies that actors are immersed in, but to trace how the actors themselves deal with controversies. Latour’s choice of the term controversies seems particularly relevant to his focus on the practice of science. For this project, I choose the term *uncertainties* because this reflects the scale of interaction that this project explores. I follow the emergent relationships among parents, their children, and the technologies and resources they use to communicate and examine how uncertainties that emerge in these relationships constitute spaces of change or agency.

For posthuman scholars, the surprises and uncertainties introduced by interactions are particularly important because they reveal how agency or possibilities for change emerge through interactions. These theorists explore the unexpected paths that actions take, as in Bennett’s (2010) description of the 2003 Northeast blackout. The Northeast blackout was a widespread power outage

that impacted 50 million people in Canada and the U.S. (U.S.-Canada Power System Outage Task Force, 2004). The U.S.-Canada Power System Outage Task Force describes the electricity grid as “one large interconnected machine” (p. 4), which corroborates Bennett’s description of the electric grid as an assemblage of various actors. Bennett argues that “assemblages are not governed by any central head: no one materiality or type of material has sufficient competence to determine consistently the trajectory or impact of the group” (p. 24). As assemblages are theorized to be decentralized collections of actants not completely under the control of human will or intention, the various actants and their relations create new or different paths of action. For example, Bennett explains that while many human and nonhuman elements contributed to the blackout, prioritizing the actions of the humans—energy traders and government officials who deregulated and privatized the energy sector—leaves a large part of the action of the blackout in the dark. The unexpected path of electricity, the brushfire, and other nonhuman actants remain underexplored and the interrelations of the energy system lie inaccessible for improvement or critique. Exploring uncertainties or controversies illuminates the reconfigurations and reconstitution of assemblages and the agency or possibilities for change brought about in unstable states.

Posthuman Agency and Disability

In opposition to exclusively social models of disability, posthuman approaches, though varied, tend to focus on the embodied experiences of humans interacting with and through technologies. Posthuman oriented theories show how seemingly singular actors and actions are the result of collectives of human and nonhuman, troubling notions of autonomy and independence (Barad, 2003; Haraway, 1987; Latour, 1991). In disability contexts, posthumanism provides the opportunity for examining the complex, dynamic actions of both human and nonhuman entities that contribute to enacting inclusion and exclusion for people with disabilities. This approach to

disability reconfigures agency as distributed across human and nonhuman actors in assemblages of interactivity.

Disability studies scholars have approached agency as distributed by theorizing relationships among human bodies and technology. Donna Haraway's cyborg figure, a human-machine hybrid, has been influential in disability studies' reconceptualization of bodies and abilities (Booher, 2010, 2011; Moser, 2000; Siebers, 2000). Haraway's cyborg figure is a human-technology invention that disrupts the nature/culture divide. The cyborg's rupturing of body boundaries resists normalizing discourses of rehabilitation (using technology to normalize the body) by providing a political position that demands new definitions and ways of thinking about bodily categorization. Posthuman scholarship in disability studies has tried to understand how cyborgian human-machine assemblages function, and in particular how agency can be characterized in these assemblages. Posthumanism proposes a radical symmetry between actors—both human and nonhuman—in a network. This symmetry theorizes that agency or the ability to affect changes in the network is distributed across actors. In posthuman theories, agency is not equivalent with intention or goals, rather it can be understood as functions (Galis, 2011, p. 831). The radical symmetry between actants in posthuman theories makes it possible to develop a greater understanding of how material entities—whose impact extends beyond their use as tools for human agents—impact human experience. Barad's (2003) "agential realism", is again helpful for developing this account of agency. To address the failures of social theory to account for materiality, Barad's agential realism posits that separation (agential cuts in Barad's terms) among entities is created through "intra-actions" of discursive-material practices in local phenomena. These separations create distinction and thus meaning as meaning arises from recognition of difference. Through these intra-actions, agency emerges, not as a property of individual entities, but as an "enactment" of "changes" in the discursive-material practices of intra-actions. Barad's account of agency is interesting when compared to socially

oriented accounts of agency because it suggests that we should be less concerned with the attribution of agency to humans or to technology. Rather, we should work to understand how to make changes to the “material-discursive apparatuses of bodily production” or the assemblages of human-technology actors. Barad’s agency suggests that we should also be aware of how nonhuman entities function and impact actions.

Towards a Working Definition of Posthuman Agency

Posthuman agency, then, for the sake of this project is not a procession of particular actors, but rather the possibilities for action that emerge from interactions among actors—humans and nonhumans—in assemblages. Agency is distributed across the assemblage in the sense that action requires and results from interactions among multiple participants—no participant acts alone. Agency is emergent in the sense that possibilities for action or change arises out of interactions among the various actors in an assemblage. The posthuman approach to agency I adopt for this project frames the kinds of questions I ask and the kinds of data I examine. This distributed, emergent notion of agency implies that making changes, interventions, or improvements in users’ relationships with technologies requires examining how actors interact and how openings, breakdowns, or possibilities emerge from these interactions.

What Does a Distributed, Posthuman Theory of Agency Get Us?

If human and nonhuman bodies are entangled in assemblages of agency, what then are the implications of this agency for people with disabilities? How, in practice, can this agency account for the exclusions and discrimination people with disabilities often encounter? And what is lost or gained in giving up the notion of the autonomous individual? In this section I examine the implications of posthuman agency and argue that this approach to agency helps to create new ways of intervening in human-technology relationships by challenging traditional notions of independence; accounting for the agency of technologies; by broadening our notions of

accountability; and opening new possibilities for change and intervention in human-technology relations.

Rethinking Independence and Agency

Disability studies scholars working from posthuman frameworks have suggested that concepts like autonomy and independence can be misleading as measures of agency because they obscure the complex, interconnected reality of socio-material conditions. To say, as popular portrayals of disability often do (Moser, 2006; Reeves, 2011), that technologies like wheelchairs or voice generating devices provide autonomy or independence disregards the dependencies created by these artifacts and the systems within which these artifacts function. However, for individuals with disabilities, social notions of autonomy and independence can be very important for self-identity and quality of life. Perhaps what is needed to better understand the dependences that everyone including people with disabilities experience, is a reconceptualization of the independence/dependence divide. Gibson (2006) employs Deleuze and Guattari's concepts of connectivity and desire to discuss notions of disability, independence/dependence, and the self and other. According to Gibson, Deleuze and Guattari's concept of "desire" as a productive force breaks down the Cartesian distinction between self and other. For Deleuze and Guattari, social pressures that prioritize "individualism and autonomy" repress desire's productive potential (Gibson, p. 190). Desire as a productive force opens up possibilities for connections and change. In the context of disability, Gibson proposes, "The goal of independence limits desire and the appreciation of connectivity. It reinforces disability as limitation rather than possibility and thus may contribute to legitimizing the repressive systems that exclude disabled people" (p. 190). Gibson's connectivity shares correlations with Barad's theory of "intra-action" and "reconfiguration". Connecting and reconfiguring humans and technologies in assemblages provide spaces for changes that can benefit people with disabilities. Furthermore, the productive force of connectivity and intra-action remove some of the stigma in

notions of interdependency. Moser (2006) discusses this process of connectivity and its relation to independence/dependence:

What becomes clear here, then, is that independence may require a lot of technologies and/or other material objects and arrangements to which one becomes attached.

Independence is not simply about disconnection, but also about the shifting out and replacement of some attachments (or dependencies) by others. It is also about the distribution and delegation of tasks: moving for instance from attachments in the form of delegation of tasks to people delegating, instead, to things, technical aids in the widest possible sense, or even parts of the physical environment. Becoming independent thus turns out to involve discrimination, a process where you find out what kinds of attachments and dependencies are necessary, optional, good, not so good, better or worse than others. (p. 380)

In Moser's description becoming *independent* through technology is a process of taking on new *interdependencies*—identifying the attachments and relations that are the most beneficial and suitable for individuals and for the assemblage. Moser's notion of *discrimination*—or distinguishing between relations—parallel's Barad's agential cuts or separations that allow for reconfigurations of human-technology assemblages. These theories suggest that for people with disabilities, agency can be understood not as the isolation from other humans through technology as in traditional notions of independence, but as the process of working out assemblages of human-technology relationships that best suit the needs and functions of the various actors in these configurations. To recognize, as Haraway does, that we are all cyborgs, is to know that we are moving in and out of dependencies or connectivity in our embodied interaction with people, technologies, and our environment. Perhaps this is a positive step towards breaking down the stigma of dependency that is unequally directed toward people with disabilities. Furthermore, examining these connectivities or dependencies, helps

us not to lose sight of the embodied experiences of people with disabilities as they move in and out of assemblages.

Agency and autonomy are often positioned in opposition to dependency—gaining independence means gaining agency. Posthuman approaches to disability allow for an understanding of disability that acknowledges how bodies are entwined in interconnecting systems of humans, care practices, technologies, cultural views, and a variety of other factors. Agency is gained not in throwing off these systems but in the productive reconfiguring and honing of these relations, and in the examination of breakdowns at the boundaries. Here, Barad is again helpful:

In summary, the universe is agential intra-activity in its becoming. The primary ontological units are not ‘things’ but phenomena—dynamic topological reconfigurings/entanglements/relationships/(re)articulations. And the primary semantic units are not ‘words’ but material-discursive practices through which boundaries are constituted. This dynamism *is* agency.

Agency is not an attribute but the ongoing reconfigurations of the world. (p. 818)

Recognizing interconnectivity *and* the fissures and rearrangements it creates provides recognition of the systems people move in. It acknowledges their experiences within these systems and provides for a dynamic agency of becoming through reconfigurations of new connective possibilities.

Accounting for the Agency of Technologies

In letting go of the belief that technologies make people independent, posthuman agency allows scholars to move beyond the tool metaphor to describe the role of technology or other nonhuman elements in interaction. As McNely and Rivers (2014) argue, in posthuman accounts of human-technology interactions “things are not simply projections by, containers for, or artifacts of human activity: not fetishes but actors”. When technologies are actors, researchers may attend to the ways that they impact and shape interaction jointly with other actors in assemblages or networks. Theorizing technologies as active illuminates the unexpected and unintended impacts that may occur

when actors interact within networks of relations. Interactions within assemblages do not always proceed as humans intend. In the messiness of interaction in the world, problems arise in our relationships with technologies often not because of a single factor, but because of interactions of a whole host of actors. This network approach to technology is relevant at a large scale—such as Bennett’s analysis of the 2003 electricity grid failure—as well as for technologies used in more intimate and smaller scale network as in the AAC technologies used by the families in this research project. Understanding the ways that technology use diverges from human intentions requires more than a tool metaphor of technology; it requires researchers to explore the relations among human intentions, technology design, and hosts of additional actors to better understand the unexpected or unintended contributions that shape such interactions. As Mol et al. (2010) state, “technologies...do not work or fail in and of themselves” (p. 14). Rather, technologies are parts of complex networks, impacting and being impacted by other actors, and these interactions constantly shape and reshape our relations to technologies and the goals we wish to accomplish with them.

Furthermore, rejecting the tool metaphor of technology means loosening the tie between human intention and technologies’ functions, creating space for examining the surprising and creative outcomes of human-technology interaction. Recognizing the unexpected contributions of technologies in interaction is particularly important for usability research, an area of TPC scholarship and practice I will focus on in the fifth chapter of this project. Laboratory-based usability research tends to frame technologies as tool that extend human intention; thus, usability research has largely focused on the extent to which users working with technologies can meet pre-determined needs or goals of developers. However, more recent approaches to usability have favored an ecological and posthuman approach that situated usability within networks of interaction (Gouge, 2016; McNely & Rivers, 2014; Rivers & Söderlund, 2015; Spinuzzi, 2001; Teston, 2012). A posthuman approach does not mean that developers and users’ goals should not be considered in usability; rather, this

approach attends not only to human intentions but also to unforeseen breakdowns in networks by examining the relations and impacts among actors in a network. Usability is a particular concern of this project as one of my aims is to consider how families and children like those featured in this project may improve their children's lives through AAC use. My approach to issues of usability is to examine AAC technologies as participants or actors in families' communication networks and to explore how interactions within these networks shape possibilities for communication and action for children with CCNs. Thus, to have a greater understanding of the challenges that families face when integrating AAC into their daily interactions, I plan to examine human intentions and practices (those of technology developers, parents, and children) in conjunction with the contributions of other nonhuman actors (features of the AAC technology, physical position and orientation of actors in interaction, technical manuals and documentation, etc.).

Broadening Accountability

Just as agency is distributed among actors so too is accountability in posthuman accounts. Social constructionist approaches to agency emphasize the importance of responsibility and accountability in examining relationships between authority structures, technologies, and users. Unequal power distribution and rhetorical responsibility are significant concerns for human-technology relationship, and it seems important that theories of agency address these issues. As technologies participate along with humans in producing possibilities for change, responsibility also becomes dispersed among humans and nonhumans. If technology is acting in networked relationships with humans, who is responsible for these actions and who can take responsibility for intervening and evaluating them? It may be that we have to give up some share of agency and responsibility in order to gain a deeper understanding of the complex interactions of humans and machines (Latour, 1991). The emergent, dispersed, and networked agency of posthuman theory does not mean that humanist concern for equality and ethics can be disregarded. Mara and Hawk (2010)

write that “posthumanism does not usurp the human but extends agency throughout the environment” (p. 4). Latour (1991) also argues that dispersed agency does not remove the possibility for human’s ethical judgments regarding human-technology relationships. He contends that “in order to make a diagnosis or a decision about the absurdity, the danger, the amorality, or the unrealism of an innovation, one must first describe the network” (p.130). In describing the network or the assemblage of actors and considering their relations and the effects and agency that arise from their interactions, scholars may better understand responsibility as also dispersed, and may consider new strategies for addressing accountability that take into account the array of actors and relations that bring about effects. As Bennett (2010) argues, “the notion of confederate agency does attenuate the blame game, but it does not thereby abandon the project of identifying (what Arendt called) the sources of harmful effects. To the contrary, such a notion broadens the range of places to look for sources” (p. 37). Posthuman agency opens new possibilities for exploring action and change considering both the unexpected and unintended contributions of both humans and nonhuman actants. This focus on the uncertain, the unexpected, the creative in daily interactions allows researchers, developers, technology users, and other stakeholders to reconsider strategies for intervening in and improving human-technology relations.

New Possibilities for Change and Intervention

TPC scholars see posthuman theories of agency as a means of gaining a deeper understanding of the role of technical communication in an increasingly automated and technologically mediated world. Mara and Hawk (2010) argue that “The prevalence of increasingly seam-less human-machine-network environments calls for broader and more rigorous investigation of technical writing’s connections to the automated and globalized workplace and the multiple systems that users and producers inhabit” (p. 6). Examining these globalized, complex systems involves a variety of actors that impact both the production of technical communication and

technologies as well as the potential users interacting within these systems. A posthuman approach to agency allows researchers to better examine the interrelations and interagency that emerges from these interactions. McNely, Spinuzzi, and Teston (2015) write that “Although research in technical communication and rhetoric has often focused on discursive relations and effects they generate among human actors, the radical symmetry of new materialism explores interagentive potentials by asking how things relate and produce effects as assemblages” (p. 5-6). This focus on interagentive potentials brings new opportunities for intervention and change in these systems as it implicates relations as the site of change rather than discrete producers, texts, technologies, or users. In other words, the types of interventions and change are multiplied by the incorporation of nonhumans and by the focus on associations and relations.

Ultimately, the goal of much technical communication research and practice is to improve the experiences of end users interacting with technologies and texts. This posthuman perspective, rather than negating human experience, opens up space for a deeper consideration of the complexity of experience. As Mara and Hawk (2010) argue, “Precisely because technical communicators have always been writing and living in organizational systems, we have had an emerging awareness of the gaps in understanding between the fabricators of such systems and the end users who may not be aware of the intricacy of some of these systems” (p. 2). Technical communication scholars and practitioners may leverage their position within these systems to explore the complexities and missing masses that impact user experience and create challenges for users.

Conclusion

In this chapter, I’ve contrasted a posthuman approach to agency with primarily social approaches arguing that posthumanism helps to open our analysis of human-technology relations to a networked view of action. I have argued that posthuman accounts of agency allow for a more nuanced and complex understanding of human-technology relationships by acknowledging the ways

that action and agency are distributed among actors within assemblages and are emergent in interaction within these assemblages. As previous scholars have shown, this posthuman perspective has much to offer TPC scholarship on human-technology interaction as it opens for analysis new ways of examining how various actors—both human and nonhuman—and their interdependencies shape agency. On this view, agency is the result of interdependences and relations among various actors enabling certain actions and constraining others. Finally, for people with disabilities interacting with technologies, this approach to agency relieves pressures for humans to meet normalized standards of independence by re-assessing the value of interdependence and collective action (Gibson, 2006; Moser, 2006). This posthuman move also removes the burden of achieving independence from individuals with disabilities by figuring action as emergent in networks or assemblages of actors. A normalized view of independence can be challenged by analysis that focuses on reconfiguring relations in assemblages so that certain possibilities or agencies become available. For TPC scholars and practitioners, examining the embodied social actions that constitute technology use can help us to consider how not only technologies, but also relations might be remade to bring into being certain possibilities for action than benefit and empower users.

Overview

In this chapter, I lay out the relationship between my posthuman theoretical approach and my methodology, outlining how my methods contribute to a posthuman theoretical approaches to human-technology interactions. In Chapter's 1 and 2, I've outlined a posthuman theoretical approach that figures agency as emergent in interactions within collectives of human and nonhuman entities. This theoretical approach prioritizes studying the practices and interaction within these networks and opens up for analysis the ways that collectives and nonhumans shape interaction along with humans. A posthuman theoretical shift in TPC calls for new methodological approaches that help technical communicators to better account for the “densely interwoven set of systems” in which they work and to help users and communities better “navigate complex systems” (Mara and Hawk, 2009, p. 2). In their review of technical communication methodologies, McNely et al. (2015) write, “research in technical communication and rhetoric has often focused on discursive relations and effects they generate among human actors, the radical symmetry of new materialism explores interagentive potentials by asking how things relate and produce effects as assemblages” (p. 5). As such, technical communication scholars have taken on posthuman and new materialist inspired methods to explore the complex ways that collective action among humans and nonhumans impact and shape the work that they do. In the intro to their edited collection *Posthuman Praxis in Technical Communication*, Richards and Moore (2018) note that, “If, indeed, objects can wield rhetoric, scholars in technical communication face new challenges and, we argue, can innovate solutions to potential or existing problems. It follows, then, that the posthuman necessarily brings along new configurations of the role of theory in our work” (p. 8). My project's contribution to this theoretical and methodological work in technical communication is twofold: (1) I offer a method for analyzing micro-elements of human-technology interactions and (2) I extend technical communication work

on embodied experiences with technology adoption, usability, and accessibility to the context of families' and children's interactions with technologies.

As the field of technical communication grows to explore communication in a variety of modalities and contexts, our field's methodologies also must adapt to these new contexts (St.Amant, 2018). My methodological approach bears some resemblance to recent work by technical communication and rhetoric of health and medicine which uses ethnographic observations to explore relationships between human and nonhuman actants (Fountain, 2014; Gouge, 2016). For example, Gouge (2016) examined the interactions of patients and clinical professionals surrounding hospital discharge instruction templates. Gouge found that the discharge templates at the clinic she observed were not dynamic enough to account for communicative needs of patients and clinicians that emerged through their interactions. My work is similarly grounded in close observations and examination of interactions among participants and technologies as I frame technological adoption as the local sociomaterial practices that people engage in with other humans, technologies, and objects. This approach aligns with posthuman theorists working in the medical humanities and is particularly inspired by Annemarie Mol's work *The Body Multiple*. Mol (2003) writes, "The ethnographic study of practices does not search for knowledge in subjects who have it in their minds and may talk about it. Instead, it locates knowledge primarily in activities, events, buildings, instruments, procedures, and so on" (p. 32). For Mol, an object's or technology's ontology is not singular and limited to a specific text or participants' perceptions. Rather, the meanings of objects are constituted and reconstituted moment-to-moment through interactions. Mol describes objects as entities whose "identities are fragile and may differ between sites", signifying that the ontologies of objects are multiple and are collected and understood only through observing multiple instantiations of these objects in practices (p. 43). This posthuman approach to the ontology of technologies and objects leads me to explore technological adoption as iterative practices constituted through ongoing

engagement among families and AAC technologies. I argue that what AAC technologies mean for these families' interactions and for notions of independence is constantly being negotiated and reworked through sociomaterial practices as parents and child interact with each other and the technology. My methodology, therefore, attends not only to participants' perception of AAC technology collected through interviews and participant field notes, but also through an examination of participants' embodied practices with technologies. I contend that studying the embodied, micro-features of interaction can help researchers to analyze the processes whereby technologies are integrated into users' networks and to examine how different configurations of these users' communicative assemblages bring about new possibilities for action and agency.

My approach combines ethnographic interviews and observations and conversation analysis (CA). CA help me to capture the moment-to-moment unfolding of interactions by observing how collaboration among a variety of actors and modalities shapes communication and technology use. I argue that a focus on the micro-elements of interaction can help our field to gain a better understanding of how technologies become or fail to become parts of users' networks. My hope is that CA, a methodology seldom used in technical communication, can help technical communication researchers to explore the intimate interworking of human-technology relationships. CA allows researchers to analyzing how breakdowns occur and boundaries are enacted in interactions with technologies and texts and can help us to see how participants negotiate and resolve these interactional fissures.

Writing about technical communicators relationships with their material work environments, McNely (2015) writes, "We need methodologies that account for how users actually interact with their ambient environs" (p. 50). In addition to exploring our own embodied practices, examining the embodied interactions of the groups who are impacted by our work can help us to better understand the usability of technologies and texts. My study contributes to this need by exploring how

technology use is grounded in embodied practices and interactions of collections of actants. Specifically, as previously mentioned, my study explores how elements of interaction—such as gaze, gesture, facial expressions, and utterances—contribute sequentially to technology practices. My methodology attends to the ways that these human-oriented elements of interaction interface with contributions and qualities of the AAC technology as well as other material elements such as toys and physical spaces to shape the families’ communication practices. This attention to interactional minutia, allows me to explore technological adoption as an embodied practice, grounded in social and material relations of bodies.

In the following sections in this chapter, I further unpack the connections between my posthuman theoretical framework and the methods I employ for examining the ways that AAC is integrated into families’ communication practices. I do this by describing this study’s foundational theoretical concepts—agency at the seams, agential cuts and boundary enacting practices—and connect them to my methodological approach based on conversation analysis. Following this discussion, I outline the types of data I collected, my methods, data collection process, and analysis process.

Methodology: Uniting Theory and Praxis

Agency at the Seams

As discussed in Chapter 2, I draw from posthuman and new materialist approaches to human-technology relations to theorize agency as possibilities for action resulting from interactions within an assemblage of human and nonhuman actants. In this project, my goal is to explore families’ processes of technological adoption by examining how the micro-elements of interaction contribute to and constrain possibilities for agency. I am interested in examining how posthuman agency emerges in these interactions and how this agency impacts the way we understand independence for children with disabilities interacting with and through technologies. The title of my

project “Agency at the Seams”, reflects the posthuman position that agency emerges from interaction among assemblages. I theorize seams as moments where collectives are breaking up and fissures among participants are emerging. Actants are always moving into and out of relationships with each other and into and out of alignment with the work of the larger collective so that change is the typical state of assemblages (Bennett, 2010). This means that participants are always negotiating and renegotiating their relationships as they interact with one another. Such negotiation reveals the seams of assemblages—spaces where breakdowns in communication or boundaries among participants occur. Seams call on participants to reconfigure their alliances and practices, to create new ways of interacting together. For the perspective of a technical communicator, the boundaries or fissures of collectives can demonstrate what is not working about the particular configurations of that collective and how they might be remade as to provide possibilities for future action.

Agential Realism & Agential Cuts

One way that I theorize the seams of assemblages in this project is through the notion of boundaries. Specifically, Karen Barad’s theory of agential realism is instrumental for theorizing agency and operationalizing the notion of boundaries for this project. I briefly discussed Barad’s theory of agential realism in Chapter 2, and here I delve deeper into the implications of agential realism for this project’s methodology. To do this, I discuss the key elements of agential realism—phenomena, apparatus, agential cuts, and boundaries—and connect these concepts to my own methodological approach to examining agency in boundary making practices.

In the introduction to her article “Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter”, Barad (2003) critiques the social construction paradigm of action, asking, “How did language come to be more trustworthy than matter? Why are language and culture granted their own agency and historicity while matter is figured as passive and immutable, or at best inherits a potential for change derivatively from language and culture?” (p. 801). To address the

relationship between language and materiality, Barad explores how matter, language, and culture are entangled in action. She argues for a view of action focused on practices—what she terms performativity. For Barad, theories of action based solely on representation are inadequate because they privilege the knowledge of humans in enacting power over matter through representation; this privileging creates a separation between the representation and what is represented and fails to account for the ways that material is active in shaping action. Social Construction approaches theorizing language¹² and social forces as the determiners of matter reduces matter to a passive object of human manipulation. Barad argues instead for a theory of agency and action that accounts for “the materialization of *all* bodies—‘human’ and ‘nonhuman’—and the material-discursive practices by which their differential constitutions are marked” (p. 810).

Barad’s theory of *agential realism* unites the act of representing to the phenomena that is being represented. Rather than assuming a separation between a knowing observer and phenomena that can be manipulated, categorized, represented, and tamed through language and representation, Barad argues that the observer and the observed are part of the phenomena and only emerge as subject and object through the act of observing. Phenomena, for Barad, are “ontologically primitive relations—relations without preexisting relata”, not something that exists outside of the observer to be described and understood (p. 815). For Barad, the position of observer or subject and observed or object do not preexist the act of observing. Barad writes,

It is through specific agential intra-actions that the boundaries and properties of the “components” of phenomena become determinate and that particular embodied concepts become meaningful. A specific intra-action (involving a specific material configuration of the

¹² According to Hutchby (2001), conversation analytic approaches to technology avoid Barad’s critique of social construction in that they acknowledge the impacts of technologies in affording or constraining interaction by virtue of their material qualities. Hutchby argues that matter does not determine interaction, but rather opens up certain possibilities for action and limits others.

“apparatus of observation”) enacts an *agential cut* (in contrast to the Cartesian cut—an inherent distinction—between subject and object) effecting a separation between “subject” and “object.” That is an agential cut enacts a local resolution *within* the phenomena of the inherent ontological indeterminacy. (p. 815).

On this view, Barad argues, it follows that apparatuses, like observers, are not external to the phenomena which they propose to investigate. Methodological apparatuses are “dynamic (re)configurations of the world, specific agential practices/intra-actions/performances through which specific exclusionary boundaries are enacted” (p. 816). Under Barad’s account of action, the practice of observing, or the “apparatus of observations”, creates a distinction, an agential cut, within phenomena¹³. This act of cutting brings into being distinctions or properties of components of the phenomena. Thus, what phenomena are and what components of phenomena are can be recognized only through intra-actions, through the practice of making agential cuts and forming boundaries. For Barad, enacting agential cuts describes the process by which researchers bound off the components of a phenomena through specific material configurations of an apparatus. Researchers and scientists are thus implicated in the act of measuring and characterizing phenomena—they are part of the phenomena they explore and their apparatuses of observation are not isolated external devices for measuring, but co-evolving components of the phenomena they study. They are part of the meaning that their discursive practices and cuts create.

Boundaries

As my project is primarily interested in moments of agential change at the seams or fissures of collectives, I draw on Barad’s theory of agential realism to understand how boundaries are enacted within collectives and how these boundaries impact the ongoing intra-activity. First, as I

¹³ Barad’s (2003) article focuses mainly on the role of the researching in creating agential cuts; later in this chapter I will extend the notion of agential cuts to research participants’ boundary enactments.

previously mentioned Barad speaks of agential cuts as practices that researchers enact when they explore a phenomenon. The meaning of the component parts does not exist to be found prior to these cuts—the cuts create meaning and difference within a phenomenon. Moreover, agential cuts are not enacted through representation alone, but through discursive practices of meaning making. Barad explains that, under an agential realist theory:

Meaning is not a property of individual words or groups of words but an ongoing performance of the worlds in its differential intelligibility. It its causal intra-activity, “part” of the world becomes determinately bounded and propertied in its emergent intelligibility to another “part” of the world. Discursive practices are boundary-making practices that have no finality in the ongoing dynamics of agential intra-activity. (p. 821).

For Barad, discursive practices that produce meaning are not simply representations of the world. They are performances in which meaning arises through intra-action—meaning emerges and boundaries are created through interaction and relations. Importantly, Barad argues that discursive, or meaning making practices, and materiality are not reducible to each other, but also do not exist prior to each other. Meaning making and materiality are “mutually entailed” in interaction, so that they are co-produced through intra-actions. Furthermore, Barad emphasizes that discursive material practices are not stable universal forces. Instead, they occur at local levels, where boundaries are configured and reconfigured again and again in ongoing interaction. This approach to discursive material practices is important for this project because it specifies that meaning results from the “conjoined material-discursive nature of constraints, conditions, and practices” (p. 823). Barad’s theory is useful for operationalizing an account of interaction and communication that does not rely on representation alone to inform and determine how material and embodied components of interaction impact the activity and the agencies that emerge through this activity. My project takes this approach to explore embodied interactions and to account for how linguistic, representational,

and material components of communication are co-evolving and co-produced. Furthermore, examining the mutual-unfolding and coordination of meaning making practices and materiality from an agential realist perspective grounds this project in an intra-action based understanding of agency. This posthuman agency allows me to explore the unexpected ways that technologies and other nonhuman participants impact communication and technology use.

To think about how this theory may be operationalized in practice, it's helpful to explore an example from a technical communication study. Johnson and Johnson (2018) use Barad's theory of agential cuts to explore how agency is attributed in a case study exploring how their child was lost by the public transportation system on his way home from school. As researchers, they describe how they bounded certain moments of their case study phenomena—the intra-activity involving their school and the public transportation system—to explore how, in these specific instances of the case, agency was attributed to components of this phenomena such as the school transportation coordinator, zip cable ties, dismissal labels, and bus drivers. They argue that for technical communication researchers, this practice of making agential cuts to explore how collective action occurs in immediate instances of interaction helps to illuminate how accountability is attributed to different components of intra-action, such as zip ties or coordination supervisors. In bounding off certain instances of intra-activity, they were able to trace how nonhumans and humans co-evolving actions contributed to their child's getting lost and how accountability at certain points in this process was attributed or deflected by different components of the system. They explain that these components became reduced metonymical objects that carried the responsibility of the collective actions of the larger system. Johnson and Johnson's approach to agential cutting informs the way I think about my own role as a researcher and as part of the phenomena I observe. I acknowledge that I am part of my phenomenon and that the cuts that I enact exclude certain possibilities from my analysis and include others.

In addition to my role as a researcher in bounding off instances of intra-activity for analysis, I extend Barad's notion of agential cutting to the boundaries that participants themselves enact in intra-activity. I do this by observing the ways that they align with or dis-align from the ongoing work of the interaction. The boundaries I explore are not necessarily between humans and nonhumans, but rather boundaries that are enacted within collectives of human and nonhumans. Barad writes that "a posthuman account calls into question the givenness of the differential categories of 'human' and 'nonhuman,' examining the practices through which these differential boundaries are stabilized and destabilized" (p. 808). To this point, in my research, I explore how collectives of actants—such as humans, their communicative work, aspects of the technology, and other material elements—come together or break apart during interaction and how the boundaries within the assemblages that are created in this process open up or constrain certain possibilities for action. Participants in my data constantly formed and reformed alliances and created boundaries among their interactional assemblages. I trace these enactments by attending to what is included in their interactions and what is excluded, noting how these boundary enactments offer or constrain possibilities for future interactions. Barad's theory of agential realism is helpful in the case of my research because it provides a way to examine how collective action among nonhumans and humans occurs through an examination of moment-to-moment instances of intra-activity. For example, one of the primary themes that emerged as I transcribed and analyzed the interactions of parents and children with the AAC device is the constant reshaping of the activity at hand. Participants were continuously recruiting and reacting to elements such as toys, the structure of utterances, the position of the AAC device, and other elements that emerged as relevant in the interaction. These iterative boundary enactments create interaction that is never a stable assemblage of components, but rather a flux of actants moving into and out of relationships with each other. Barad's theory of boundary enactment gives me a way to explore the collective and boundaries that are formed, dispersed, and reassembled

during this complex activity. This theoretical approach also allows me to consider the value or interactional benefit of certain interactional configurations and certain bounding practices. In particular, in my preliminary analysis, I note how the presence of toys such as chalk or playdough impact the families' interaction with the AAC device, a finding I discuss in future chapters. For a more specific explanation of my method for identifying boundary enactments, please see my discussion below in the methods section.

Conversation Analysis

In addition to identifying boundaries in intra-action, my project explores communication breakdowns as agential spaces. Conversation Analysis (CA) is one of the primary methodological inspirations for my project because it allows me to examine interactional breakdowns among families and their AAC technologies in very specific and detailed terms at the micro-level of interaction. Although traditional conversation analytic work is often focused on identifying and describing norms of spoken interaction, I follow language and social interaction-based approaches to CA that explore a variety of modes (gestures, gaze, facial expressions, pitch, intonation, etc.) in interaction (see for example edited collections by Streeck et al. 2011 and Nevile et al., 2014). The main methodological argument of conversation analysis is that researchers can understand how intersubjectivity among participants is developed based on how each interlocutor responds to the previous contributions of others. Consequently, the field of CA holds that there are norms of interaction that govern how participants respond to each other. In this section, I provide a brief description of CA and explain how I adapt this methodology to my posthuman theoretical framework.

CA constitutes a field of research that examines the micro processes of human social interaction as manifested in the sequential organization of talk (Schegloff, 2007; Sidnell, 2010). CA emerged from research in the field of sociology when Harvey Sacks, Gail Jefferson, and Emanuel

Schegloff used audio recordings to analyze how talk is collaboratively constructed among interlocutors. The major findings of these early analyses revealed that conversation is sequentially organized in that every utterance sets up expectations about the interlocutor's response and thus what will come next. Adjacency pairs, such as greetings which include a first-pair part that projects a response greeting in return, are basic features of this sequential organization. By examining how interlocutors respond to utterances that precede, researchers build an understanding of the interaction that unfolds as each participant responds to what has been made relevant and actionable in previous turns at talk. Through detailed transcriptions of recorded interaction, CA looks at how listeners and speakers work together to establish intersubjectivity and co-construct ongoing dialogue. Sindell (2010) writes that CA constitutes "a highly decentralized or distributed view of human action that places the emphasis not on the internal cognitive representations of individuals or on their 'external' attributes (doctor, woman, etc.) but on the structures of activity within which they are embedded" (p. 2). The distribution of social action indicates that meaning develops through negotiation in contrast to the computational view that meaning is an essential phenomenon that transcends interaction.

Although CA scholars see conversation as locally situated and contextualized, they view the expectations for talk as trans-local cultural norms that speakers learn as they interact in communities:

Conversation analysts hold to the view that the conditions of possibility for mutually intelligible interaction include (among many other things) the existence of conventions and procedures for relating utterances together in sequences, which are learned as part of the process of becoming a competent member of a conversational community, and to which members display their orientations in the observable, behavioral details of talk-in-interaction. (Hutchby, 2001, p.79).

Hutchby explains that conversation analysts see the conventions of conversation as stable norms that carry from one context and conversation to the next. Thus, the work of the field of CA has been to identify and describe these conventions in order to understand how they are used to organize interaction. Such conventions are identified through attention to patterns of interaction across instances of talk and include conventions for organizing the taking of turns and turn transitions, the repair of breakdowns, and the use of references to people or objects (Heritage, 2011). CA holds that interlocutors orient to these conventions in order to build intersubjective understanding and also to show their stance or alignment to the ideas and content of the conversation. In addition to attending to the ways that the conventions for conversation are context-free or normative across instances of talk, CA researchers also explore how these conventions are used in particular ways in specific contexts and, in this way, are context-sensitive (Heritage, 2011).

CA and Multimodality

Given posthuman arguments that agency emerges of sociomaterial relations, I want to turn now to a discussion of the ways that CA has dealt with embodiment in interaction. CA research that makes use of video-recorded data has focused on the ways that communication is inseparable from the body and the materiality of local conditions. Streeck et al. (2011) write,

One phenomenon that quickly emerges from records that preserve not only the talk but also the bodies of actors, is that action is built through the mutual elaboration of diverse semiotic resources with quite different properties, each of which, including language, can make only a partial, incomplete contribution to the action in progress. The participants themselves attend to both this diversity and to the unique, distinctive contributions made by the different kinds of semiotic resources (p.3).

These researchers argue that language is always embodied. The material conditions of production have consequences for the patterning of interaction and for sociocultural expectations for

interactions. CA has been used to study interaction in a variety of semiotic-material contexts where people interact with each other through and with technology. For example, researchers have examined how bodily orientations, movements, eye gaze, and gestures function together with talk and material tools in surgery (Mondada, in Streeck et al. 2011), and how archeologists use didactic gestures and the dirt of archeological sites to create shared participation frameworks (Goodwin, 2007).

In Europe, CA has been used by researchers interested in disability and communication (Antaki, 2011; Antaki & Wilkinson, 2012; Bloch, 2011; Bloch & Beeke, 2008; Bloch & Wilkinson, 2004; Higginbotham, & Caves, 2002; Wilkinson, 2008; Wilkinson, Bloch, & Clarke, 2011) to explore how the various facets of interactions involving multiple interlocutors and technologies shape conversation. Many of these studies are examinations of interactions involving augmentative and alternative communication (AAC)¹⁴ technologies, the type of technology that this project examines. These studies suggest that a host of factors organize conversation by impacting the sequential unfolding of the talk. These factors include the grammatical and audiological shape and timing of AAC produced utterances; interlocutors' capabilities, vocal utterances, gestures, gaze, and bodily orientations; the environment of the talk, and many other factors such as sequential timing that arise during the interaction. An example of the complexity of this type of interaction can be seen in Block and Wilkinson's (2004) study which examined how people with dysarthria¹⁵ used AAC technology in situations of communication breakdown. They found that while the conversation partners of the people with dysarthria could understand the speech produced by the AAC device, they did not always understand its relationship to trouble source or the previous talk (p. 272). Bloch and

¹⁴ AAC technologies include any type of low-tech or high-tech materials that can be used to aid the communication of people with CCNs. The research I cite above focuses primarily on high-tech AAC devices, which are electronic devices that users manipulate to produce computer-generated utterances.

¹⁵ Dysarthria describes speech that is difficult to understand due to various conditions such as Parkinson's disease, ALS, or strokes.

Wilkinson explain, “Understanding of a conversation turn involves more than understanding the meaning, grammar, or phonetic signal of the turn itself; it also involves perceiving how that turn is constructed in relation to the previous talk” (p. 280). This research reveals an interesting impact of AAC technology on intersubjectivity. In isolation, the use of the AAC device may seem straightforward—a user types on the device to create utterances that are then produced by a computer-generated voice. However, processes of interaction introduce a variety of unforeseen complexities like timing and the sequential relationships of utterances that make it impossible to understand AAC technologies without examining how they interact within conversation.

A Few Notes on Posthuman Terminology

In specifying my theoretical and methodological approach in this project, I want to take a moment to discuss the way that I plan to use some key terms from posthuman and new materialist theories of action. Defining these terms here will help to make explicit distinctions in the ways that I describe my data in the analysis portion of this project.

Actors & Actants

Posthuman theorists like Latour and Bennett use the term *actant* for both human and nonhuman entities that can impact other entities or actants. In the introduction to their edited collection *Posthuman Praxis in Technical Communication* Ricshards and Moore (2018), explain “An actant is a source of action, which can affect situations. Actants, of course, are never alone (they’re always assembled), and this Latour advises, shifts and troubles our ability to study the social” (p. 7). In a similar way, Latour (1991) uses the term *actor* in Actor Network Theory to connote an entity that is assembled or constructed of other components and, in this way, is always in flux. In this project, I use the terms *actant* and *actor* interchangeably to signify entities, both human and nonhuman, that have particular impacts. Here my use of *actor* and *actant* are not tied to the notion of intentional action, but rather general action.

Assemblages, Collectives, & Networks

The term *assemblage* indicates that different pre-existing entities, with agencies of their own, have been brought together or assembled, and that the action that results from this collecting or bringing together is produced through the multiplicity of the complex relations within the assemblage. Bennett describes assemblages in the follow way:

Assemblages are ad hoc groupings of diverse elements, of vibrant materials of all sorts.

Assemblages are living, throbbing confederations that are able to function despite the persistent presence of energies that confound them from within. They have uneven topographies, because some of the points at which the various affects and bodies cross paths are more heavily trafficked than others, and so power is not distributed equally across its surface. Assemblages are not governed by any central head: no one material has sufficient competence to determine consistently the trajectory or impact of the group. The effects generated by an assemblage are, rather, emergent properties, emergent in that their ability to make something happen... is distinct from the sum of the vital force of each materiality considered alone. (p. 24)

I follow Bennett's description of assemblage in this project to connote a collection of different actants that when interacting together make available certain possibilities or bring about certain results. *Network*, a term I take from Latour's Actor Network Theory, emphasizes the organization and coordination of human and nonhuman actors toward a particular purpose, as illustrated by Latour's (1991) hotel manager and key analogy. In this analogy, the hotel manager wants to motivate customers to leave their hotel key at the front desk when they leave to explore their surroundings. The hotel manager performs a series of sequential substitutions, first recruiting the action of a written sign, then a verbal reminder, and finally a weight to create alignment among an increasing number of customers—thus creating a network of actors including the key, the sign, and the weight

along with the hotel customers working in alignment toward the particular action of leaving the hotel key at the front desk when sightseeing. I understand Latour's use of network to emphasize a specific coordinated effort to align different actors in an assemblage as to bring about a specific project or result. In this project, I use *assemblage* to and *collective* somewhat interchangeably to describe objects that are formed through local interactions such as when interaction is occurring among parents, children, and AAC devices. I understand assemblages and collectives as entities that emerge through boundary making practices, when I or my participants seek to make distinction and produce meaning through isolating particular material configurations of a phenomenon. Finally, I use the term network to describe a larger system of support and services which the families draw on in their process of technological adoption.

Data & Methods

Study Origin

This study came about through my relationship with a non-profit organization in a midwestern city that holds a summer camp for families whose children use AAC technology. The aim of the camp is to provide support and encouragement for families in order to help them integrate AAC into their daily communication. I became connected with the non-profit organization when the director asked if my advisor and I would be interested in conducting research with their camp. In summer 2014, I observed and volunteered at the camp to get a sense of what went on at the camp, to meet families and children, and to gain ideas for developing a research project. In the year after the 2014 camp, I observed planning sessions where the non-profit director and camp organizer worked with speech language pathologists (SLPs) and occupational therapists from the public school system to create activities and organize events for the upcoming 2015 camp. Observing these planning meetings helped me to gain a sense of the organizers and speech language pathologists approaches to AAC interaction and their goals for the camp. In summer 2015, I did a

short pilot study where I interviewed two SLPs who helped organize and run the camp and I interviewed one parent who participated along with her child and spouse in the 2014 camp. I also observed this parent interacting with her child at home.

My findings from this exploratory study, although limited due to the small amount of data I collected, suggested that SLPs and parents may have different approaches to integrating AAC into daily communication. Both SLPs, who were specialist in AAC, emphasized the importance of viewing the AAC device as a child's voice and making the AAC available for children at all times. The parent, in her interview, explained that her child seemed to view AAC as a game or school activity. She struggled to encourage him to interact with it in everyday interaction for expressing needs or wants and had difficulty knowing how much to "push" him to use AAC. The mother's experience suggested that she felt a certain responsibility to drive her child's interaction and a tension between the child's interest in using the device mainly in structured activities and her motivation to encourage him to use it more extensively in everyday communication such as at meal times or to express feelings. She explained the difficulties she experienced trying to facilitate her child's communication through AAC: "Trying to keep pushing him, not to where he's getting frustrated because...now he wants to verbalize more...I guess I'm kind of stuck sometimes of figuring out what to-how much to push." This tension the mother felt about knowing how much to "push" her child to use the device suggested to me that parents may experience uncertainty regarding their practices for integrating AAC into their communication. While the mother's interview suggests that she, like the SLPs, values the potential of AAC to help her child express himself in everyday interactions, she struggled to know what this meant for her and her child's communication practices. Working from this mother's experiences, I did a preliminary examination of the technical documentation and support resources surrounding AAC technologies and found that these texts largely focused on programming AAC devices and provided little information about

strategies or practices for facilitating communication through AAC. It's possible though, that families may access practice-based support and information through their larger support networks including interactions with speech language pathologists, AAC company representatives, non-profit organizations like the camp the families in this study attend, and other families who use AAC.

This tension between *facilitating* and *pushing* AAC use and between families' desire to use AAC and confusion about how to integrate it into familiar communication necessitates further research on technology adoption and usability. The processes whereby complex technologies like AAC become part of communication networks is not straightforward and deserves attention. This is especially the case for technologies like AAC which are surrounded by claims about agency and ability that can obscure the work and interrelations required for technologies to become parts of users' networks. To better understand this process, I developed this research project to explore the process and challenges that emerge when families work to integrate AAC into their home interactions and to consider the implications of families' interactions with and experiences of technology for notions of agency, technology, and accessibility. Ultimately, I hope the findings of this research contribute to the approaches to usability and accessibility research in technical communication, framing usability as an interaction-based process.

Research Questions

Below are the questions that guide my study:

1. How can we describe the families' interactions via AAC technologies?
 - How do human and nonhuman micro-level elements of interaction shape the unfolding interaction and contribute to affording or constraining different types of action?
 - What strategies do the children and families draw on when interacting with and through the AAC technology?

- How do participants respond to and negotiate breakdowns or boundaries that emerge in their interactions with each other and the technology?
- 2. What are the implications of the families' interactions for notions of agency in human-technology assemblages?
- 3. What are the implications of this posthuman, interdependent approach to agency in interaction for usability research in technical communication?
 - How do embodied human-technology assemblages afford agency for users?

Participants

The participants in this study are two families whose children experience conditions that limit their ability to produce verbal speech. I recruited them to participate in this study through their participation in the 2016 summer camp run by the non-profit organization with whom I had volunteered during the 2014 and 2015 summer camps. I sent an IRB approved recruitment letter via email to all the families who signed up for the 2016 camp and two families ultimately agreed to participate in the study. I will describe each family's background and situation respectively.

Family 1

Family 1 in my study included two parents and three children. The youngest child and AAC user in the family was five at the time the study began and was born with agenesis of the corpus callosum, a congenital genetic disorder that causes a total or partial failure of the development of the corpus callosum, the gray matter which connects the two hemispheres of the brain and allows for the hemispheres to communicate. People born with this condition may have trouble developing elements of speech. While this child had a high level of language comprehension as demonstrated by her ability to follow a variety of directives and respond to what others said to her, she had a limited ability to produce verbal speech. At the start of the study, her mother estimated that she consistently produced around ten words that were recognizable to her family such as names of family members

and pets. She also communicated through touch, gesture (pointing or directing for instance), vocalizations, and other combined modalities of interaction. In addition to language development, her motor skills are impacted by agenesis of the corpus callosum so that she has some difficulty with balance and doing fine motor tasks. She typically wears leg braces to help increase the flexibility of her joints, and weighted anklets and bracelets to increase her spatial awareness of her limbs. Throughout the time of the study, this child attended a school specializing in education for children with various disabilities.

The mother in this family holds an early childhood education degree and is familiar with educational strategies for interacting with young children. She was also staying at home with her daughter at the time of the study. She was very involved in her child's care and in pursuing services and support groups to address both her child's needs and her needs as a parent and support for her child. In her interviews, she expressed a strong interest in the potential benefits of high-tech AAC for her daughter. The family lived in a small community, but their home was within driving distance of a university that provided speech language pathology services that the child participated in.

Family 2

Family 2 included two parents, an older high school aged brother and a seven-year-old daughter (at the time the study began) who used AAC. The child in family 2 has Pitt Hopkins Syndrome, a genetic disorder that causes developmental and cognitive delays and difficulties. She does not produce verbal speech, but communicates through various modalities including touch, gestures (pointing or directing for instance), gaze, and vocalizations, and signs to name a few. Her fine motor skills are impacted by Pitt Hopkins Syndrome as well, so producing sign language is difficult.

This family lives in a small midwestern town and the parents own and work at a small business. The child has access to speech language pathology services at school, but the mother

indicated that the school's SLP was unfamiliar with AAC and wanted the child to focus on developing and using sign language instead. In addition to school, at the time the study began a therapist was coming to the child's home once a week to work on language and motor skills and learning activities with the child. Later into the year of the study (2016) after camp, the therapist was no longer able to come to the child's home to work with her.

These details of each family's situation show how each family's background is different. My purpose in this project is not to generalize the experiences of these two specific and limited cases to all families. Rather, I explore how the particularities of the families' networks that impact their experiences with AAC technology. My findings suggest that the two families in my study experience some similar challenges when learning to integrate AAC into their daily communication such as resistance from children toward using AAC in certain situations, as I observed in my pilot study. However, the differences in these families' situations underscore the importance in creating AAC technologies that can be used by and beneficial to families and children with a variety of needs, abilities, and environments. Moreover, differences in the families experiences and background highlight the need to understand usability as local and contingent upon family's unique communication networks.

Speech Language Pathologists

In addition to the data collected with parents and children, my study includes audio-recorded interviews with three SLPs, video-recorded data of one SLP interacting with a child at camp, and video-recording training sessions on AAC offered by SLPs for parents at camp. All of the SLPs who participated in my study had at one time professional careers in public schools working with children who use AAC. In addition, one SLP who led one of the training sessions I video-recorded worked for the company that produced the AAC system that family 2 used.

The AAC Technologies

Family 1

Family 1 used an AAC device from Talk-to-Me technologies with the TouchChat program. Unlike other companies that provide AAC software for existing hardware technology such as iPads or Tablets, Talk-to-Me Technologies produces communication dedicated AAC hardware and software packages. Dedicated devices tend to be quite expensive, and Talk-to-Me Technologies high-tech devices range from around \$2995 to \$7900, which means that many families will need insurance or financial assistance to purchase a device. The device this child used during the study duration was the WegoA model. Its screen is 10 inches and displays a 5 by 3 grid of available square buttons on each page and a text bar across the top of the screen displaying the words or phrases that a user has selected (see Figure 3.1 below to see the home page for this child's device). The device comes with pre-programmed standard buttons and a built-in icon library allowing users to depict different words and ideas graphically. For example, on the home screen of this family's device, there is a chat button that displays the word "chat" above an oval face icon with an open mouth and what appears to be a sound wave coming from the mouth. Users can create new buttons and add their own photos to buttons. The device also has different audio voice quality options including different gender coded voices and voices that simulate a child's voice. This child used the female coded child's voice for her audio output. This child's AAC home page included buttons for "Chat", "People", "Things", "I want", "I need", "School", "Questions", and "Describe". Each of these buttons, when touched, linked to a page displaying buttons for associated actions or words. For example, when the "Describe" button is touched, the device navigates to a page with buttons that represent categories of words for describing such as numbers, colors, or weather.

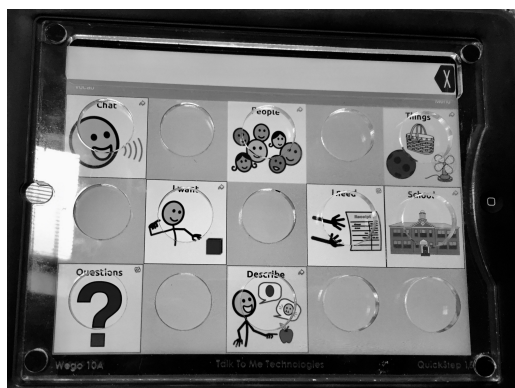


Figure 3.1. Home page screen on Family 1's AAC device.

Caption: Figure 3.1 shows a photograph of the home page screen on this child's device. The device has a text bar at the top of the screen and a 5 by 3 grid displaying the buttons from left to right: on the top row "Chat", "People", "Things"; on the middle row "I want", "I need", and "School"; and on the bottom row "Questions" and "Describe". In addition to the labels, each button contains an image associate with the button. Some buttons on each row are empty and have no text or images.

Family 1 had been recommended to use a Talk to Me Technologies device by one of the child's speech language pathologists (SLP). The family had done a two-week free trial with a device on loan from Talk-to-Me Technologies in order to prove to their insurance company that their child could use the device. They were not able to satisfy the company with their first trial, so they started a four-week trial at the start of the study. The child did not have a dedicated device at school, but she was able to bring the device on loan to school during the trial period. Although the child had been using the device for only a little less than a month when the study started, she was able to initiate use of the device to express her desire to eat ice cream or watch a particular TV show.

Family 2

The child in Family 2 had been using AAC for four years at the time the study started. They had started with a device from Prolouquo2go when this child was three years old and then switched to Go Talk Now because her school had a contract with the Attainment Company to use Go Talk NOW for children in their school system. Although the school had a contract with the company, the mother did not feel that the device was used often at school because the device was never locked on the "school" page when the child returned home from school. Although the family had owned a

device for four years, the mother indicated in her initial interview that they did not use the device often at home although they had tried in the past to integrate it into their daily communication routine. This child used AAC most often in therapy sessions with her in-home therapist.

The Attainment Company produces a variety of different communication apps and learning software programs for apple devices such as iPads and iPhones. Family 2's device was set up to display sixteen available buttons on each screen, and each page could be customized for a certain size of grid and number of buttons so that some pages in her system had as few as two or three buttons on a page. At the bottom of each page there is a bar of navigational buttons. On the left and right edge of the bar there are arrow shaped buttons that allow users to navigate left or right to flip through the pages in their order in the system. Additionally, on this bar there is a return to the home page button, a "go back" to the most recent page button, a jump button that allows users to see a grid of all the possible page choices, and a core vocabulary page button (see Figure 3.2 below). Similar to the TouchChat system, users may add pages and create customized buttons by selecting from the systems image library or by uploading their own photos or images.



Figure 3.2. Home page of Family 2's AAC device.

Caption: Figure 3.2 shows a photograph of family 2's AAC device home page screen. The screen contains 11 buttons. The top row of buttons includes "Bathroom", "Drink", "Something to Eat", and "T.V.", the middle rows contain buttons for "Outside", "My words", "I would like", "night time", and "Toys", and the bottom row contains words for "school" and "Therapy".

Data collection process

This study brings together multiple types of data collected from several sites. All data was collected from adult participants who consented to participate in the study and from child participants whose parents gave permission for their participation. I collected my pilot study data in 2015 and collected the data of the current project from May 2016 to July 2017. Below I describe how and where the different types of data were collected and explain the purposes I collected the data for.

Interviews

I collected several types of interviews for my project: videos of interviews with mothers and audio interviews with three SLPs. The interviews were around 30 minutes each and were conducted with each person individually in a convenient location, typically in their homes. The interviews were collected in order to seek both the parents' and SLPs' experience with, attitudes toward, and strategies for using AAC. I conducted a pre- and post-interview with each mother at the beginning and end of the data collection phase of the study. I also conducted a post interview with each mother after they had attended the AAC summer camp. The parent interview data provided information about the families' support networks and their own assessment of their and their child's experiences engaging with AAC.

Interviews with the SLPs concerned what they believed parents should understand about AAC and how families should approach engaging their children with AAC. The SLPs I included in my study had each volunteered to help organize and run the AAC camp that the two families in my study attended. Two of the SLPs were specialists in AAC who worked for the public-school system and the other SLP had also received AAC training and worked with children using AAC at her current job. My interview questions are included in the Appendix B.

Video-recorded and transcribed interactions

A second component of my data included video-recorded and transcribed interactions of the families and their children interacting with and sometimes without AAC. I recorded six sessions with family 1 (3 hours of video-recorded interaction data total), three sessions before the summer camp and three sessions after the camp. I recorded four sessions with family 2 (two hours total), two sessions before the summer camp and two sessions after the camp. I was not able to record as many sessions with family 2 because their child's AAC device was broken for several months. Data of video-recorded interaction sessions of parents and children allowed me to develop an understanding of the strategies that families used to interact with each other and with the AAC device, and to consider how the micro-elements of interaction, including the contributions of the AAC, shaped the unfolding interaction and possibilities for future action. This data allowed me to explore families' processes of technology adoption through close examination of their interactions. Further, I used this data to identify challenges like communication breakdowns or dis-alignments that emerged in this process and to consider how the participants negotiated these challenges.

Methods

Mixed-methods

My project uses a mixed-methods approach within a posthuman theoretical framework to explore the processes whereby AAC is integrated into families' communication networks. As part of my mixed-methods approach, I employ multimodal conversation analysis to identify challenges that emerge when families communicate through AAC technologies and to furthermore explore how these challenges are negotiated. Multimodal conversation analysis enables me to examine the micro-level elements of interaction that are typically left out of rhetorical accounts of communication, such as the coordination and sequencing of gestures, facial expressions, eye gaze, and utterances. I consider how these elements of human interaction interface with technology by way of computer-

generated sounds, screen displays, and navigational delays. Through interweaving posthuman theoretical approaches with conversation analysis and ethnographic data, my research offers new insights into the ways that macro-level concepts such as agency and independence can be enacted through and shaped by micro-level interactions with technologies. My findings highlight the need to examine usability and technological adoption from a network approach where possibilities for future action emerge from interactions of humans and technologies.

Conversation Analysis

I used a conversation analytic approach to transcribe and analyze the data of parents and children interacting with AAC in their homes. The approach I use to conversation analysis follows research on language and social interactions that pays close attention to the ways that communications is constituted by interaction among the various different modes of communication, exploring how utterances, but also eye gaze, gesture, facial expressions, physical orientation are coordinated and sequentially organized when participants interact. Along with human interaction, I analyzed the contributions of nonhuman entities, attending to the ways that the AAC technology and other objects impact and shape the ongoing interaction. Previous language and social interaction work has focused on the way that nonhuman entities are tools or resources for humans in interaction. As my methodology is informed by posthuman theories, my analysis attempts to avoid the assumption that nonhumans are passive extensions of human agency. In this sense, my methodology and description of action departs from previous work on objects in interaction (see for example the edited collection by Nevile et al., 2014). I theorize agency as emerging from collective action among human and nonhumans, so to this end, I focus on the possibilities that collective actions provide and I explore the role of nonhuman entities in interaction, providing space to see nonhumans contributions as potentially extending beyond human intention or expectation.

I use Tetzchner & Basil (2011) conventions for transcribing AAC interaction to adapt the Jefferson (2004) Transcription System. In addition to verbal contributions, my transcripts include detailed observations of human and nonhumans physical actions, orientations, and contributions to the ongoing interaction. I follow Heath, Hindmarsh, and Luff's (2010) guide for analyzing video by reviewing and categorizing my data to look for patterns and then analyzing specific instances of interaction in detail, iteratively looking for patterns across these specific instances. I present my transcriptions with abstracted screen capture photographs of participants interaction to analyze how embodied elements of interaction interface with verbal utterances produced by the human participants and AAC device. For a key of transcription conventions, see the Appendix A.

Units of Analysis: Communication Challenges & Openings

In this section, I present the units of analysis I use to explore the data, defining the terms and presenting examples.

Breakdowns & Repair

The notion of breakdown that I employ in this project comes from conversation analytic approaches to interaction. In CA, breakdowns, or “troubles” are identified when a repair process is initiated by a speaker or the interlocutor. Instances of repair signify disjointed intersubjectivity between participants due to confusion regarding previously introduced element of interaction. Intersubjectivity, “a joint or shared understanding between persons” (Sidnell, 2010, p. 12), is a key tenet of CA. This is because in order for an interlocutor to produce a next relevant action in relation to what their communication partner previously said or did, the communicators must develop a shared understanding of the previous action or trouble source. Sidnell explains that “In talk-in-interaction, each utterance displays a hearing or analysis of a preceding one and, thus, the very organization of talk provides a means by which intersubjective understanding can not only be continuously demonstrated but also checked and, where found wanting, repaired” (p. 12).

Importantly, researchers who study embodied interaction through CA and other social interaction methods contend that intersubjectivity is not a result of one interlocutor simply passing a message on to a receiver. Rather, intersubjectivity is a collective action, not necessarily a product, but a process of negotiation that communicators engage in when acting together. In this project, I identify communication breakdowns in order to explore how troubles with intersubjectivity arise and how both human and nonhuman participants shape how these troubles are negotiated and repaired. In CA, repair work is primarily concerned with examining who initiates a repair and how and by whom the trouble source is resolved. My aim is to not only look at how repair is initiated and accomplished by the human speaker or listener, but also to examine the roles of nonhuman technologies and object in this process. I explore how breakdown and repair is a collaborative process.

Boundaries

In addition to examining breakdown and repair sequences, I explore ways that humans and technologies form or eschew alliances in interaction—creating boundaries around assemblages of actants. I explore boundaries as a theoretical tool for considering what actants are participating in a collective action and what actants are excluded during interactions. I operationalize Barad’s theory of agential cutting by investigating how different collections of humans, utterances, AAC page displays, and other elements work together to create certain possibilities for action. Participant enact boundaries by forming alliances with specific entities in interaction and these groupings also create exclusions. Boundary enacting practices show how elements in an interaction come to be distinguished from others through alignment or disengagement. Boundaries among actants in an assemblage emerge through local interactions. Take as an example of a boundary enacting practice an instance in my video-recorded data of an interaction between the mother and child in family 2: In this instance, the mother asked the child, “what do you want to play with next?” while holding the AAC device in front of the child. The AAC device, which was sitting between the mother and child

was open to a page displaying photographs of the child's toys. In this moment of interaction, an assemblage is operating which consists of the mother, her question, her gaze which is directed toward her child, the AAC device and its display of toys, the orientation and positioning of the bodies in space, and other elements of the interaction. All these elements are operating together to produce certain possibilities for the child's response. Here, the child responds not by selecting a toy on the AAC screen, but by walking away and physically picking up a new toy. This is not a case of a miscommunication or breakdown as in the example above, as it seems that the child understands the mom's question based on her response of choosing a new toy. Rather, I consider this a case of a misalignment or disengagement as the child rejects the interactional assemblage that is presented to her—specifically, she does not choose to use the device to respond to her mother's question. Her rejection provides a space for her mother to reconsider the assemblage that she's enacted—she may use the same strategies again to engage the child with the AAC device or she may choose to reconfigure elements in the assemblage. What is important to note here is that the functioning of the interactional assemblage is not predetermined by the mother's intention or the child's rejection, but rather is a process of negotiation as actants interact and as these interactions make available different sets of responses.

Strategies

In addition to exploring my interaction data for breakdowns and boundary enacting practices, I also investigate the strategies that participants use in interaction. I define strategies as practices for organizing and mobilizing collective action toward an interactional goal. For example, in Clip 3.1, the SLP used questions, pointing and naming, and concealing strategies when engaging with the child and the AAC device.

Nonhuman contributions

The last unit of analysis I explore in my analysis are the ways that nonhumans contribute to interaction. I am particularly interested in exploring the practices by which AAC and other nonhuman objects are integrated into interaction. Although I attribute the initiation of these practices to human participants, I argue that these strategies are always constituted by embodied, collective action, and entanglements among human and nonhuman elements in interaction. I investigate the role of nonhuman participants such as the AAC technology, toys, and other material entities in shaping the unfolding interaction and offering possibilities for action. I explore both the ways that nonhuman actants further the communicative possibilities for the families in my study as well as the ways that nonhuman participants introduce uncertainty into interaction, as in the presence of the “Home” button on the colors page in Clip 3.1.

Example Analysis

In order to illustrate how I am identifying and analyzing instances of breakdown and repair, I present a brief analysis of a clip from my data. Clip 3.1 includes a transcript of video-recorded data of a speech language pathologist (SLP) and child participant in my study engaging with an AAC device. I have broken the interaction into four extracts for analysis; each extract represents a consecutive portion of a continuous interaction. In addition to the transcript, I use screen captures and captions of the video recorded interactions to attend to the various modalities of the interaction including the participants gaze, body orientation, and gestures and the placement of the AAC and its page displays. The interaction presented below took place at the summer camp that the families in my study attended. In this interaction, the child was interacting with a volunteer SLP while her parents were attending a training session. The SLP and the child were sitting outside on a sidewalk with a group of children and volunteers. The SLP had a box of sidewalk chalk and was asking several children to select a color of chalk they would like to use through the AAC device’s Colors

Page. The Colors Page displays a five-by-three grid of squares which contain images of crayons with the words of the matching color printed on them (see Figure 3.3). The fifth column on the right most side of the grid contains a “Go Back” button and a “Home” button.

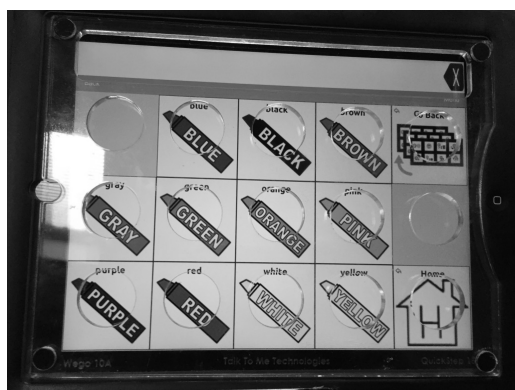


Figure 3.3. AAC device's colors page.

Caption: Figure 3.3 shows a photograph of the Colors Page screen on the AAC device.

Clip 3.1. “Choosing a Color”.

Clip 3.1. Extract 1.

- | | | |
|----|--------|--|
| 01 | SLP: | [good colors, what color do you want to do.] |
| 02 | | [((moves AAC device toward child))] |
| 03 | child: | [hhm] |
| 04 | | [((raises herself up and down while looking at screen))] |



Figure 3.4. Clip 3.1, line 04.

Caption: Figure 3.2 shows an abstracted screen shot of the SLP and child. In this screen shot the participants are sitting on the ground facing each other. In the space between them, the SLP is holding the AAC device with the colors page in front of the child. The SLP's hands are positioned to the side of and behind the device so that she is not directing the child to a particular color. The child is looking at the device and her hands are at the sides of her body.

I consider Extract 1 an instance of breakdown not because communication or interaction is completely cut off, but rather, because the child, by not choosing a color as the SLP has requested, has signaled that something about the interactional assemblage is not working for her or is hindering her participation in the activity of “choosing a color”. It’s not clear from my data whether the trouble for the child is the specific form of the question, “what color do you want”, uncertainty about the activity of choosing a color, unfamiliarity of the AAC device, another issue or a combination of issues. What matters though is that in this instance the actants in this interaction are not arranged or organized in such a way to create an intersubjective understanding between the participants for the activity of choosing a color to proceed. Although she does not respond by choosing a color, the child displays engagement with the SLP and the activity by maintaining her gaze at the AAC device and by displaying a bodily response. Additionally, after the SLP asks the question “what color do you want to do”, the child uses her arms to slightly raise herself up and down in her seated position. The sequential position of the child’s gesture makes it readable as a response to the SLP’s question. The child’s gestures also show that she is attending to the shared physical space of this interaction and to the other actants in this space. As such, I identify the interaction going on in this extract as indicating that there is a breakdown in the interactional assemblage.

The child’s gesture which refrains from engaging the AAC to choose a color cues the SLP that something in the assemblage is not working. Extract 2 follows directly after Extract 1 and in this part of the interaction the SLP begins to modify the organization of the activity she is presenting to the child by naming the colors displayed on the AAC screen.

Clip 3.1. Extract 2.

05 SLP: we have [green::,]=
 06 child: [((raises hand toward screen))]



Figure 3.5. Clip 3.1, lines 05 & 06.

Caption: In this abstracted screen shot, the SLP is pointing to the green crayon button on the AAC screen. The AAC screen is still tilted toward the child and the child is raising her right hand toward the screen as the SLP says and points to the green crayon button.

In Extracts 2 and 3, the SLP illustrates some possible choices by pointing to some of the crayon buttons on the screen while speaking the names of the color displayed on each button. When the SLP points and speaks the first color “we have green” (line 05), the child immediately raises her hand to the screen suggesting that she reads the SLP’s gesture and utterance as a request to touch a button.

Clip 3.1. Extract 3.

07	SLP:	=[oran::ge,]=
08	SLP:	((points to orange icon))	
09	child:	[((moves hand away from screen))]	



Figure 3.6. Clip 3.1, lines 07-09.

Caption: In this screen shot, the SLP has moved her hand slightly from the green crayon button to point to the orange crayon button. The child is still looking at the AAC screen, but she has withdrawn her right hand away from the AAC device and is holding her right hand against her body.

In lines 07 through 12, the SLP continues naming and pointing to colors on the AAC screen. When the SLP names the second color, “orange” (line 07), the child moves her right hand away from the AAC screen and back toward her body, indicating that she is reconfiguring her action and re-orienting to the developing shared activity (see Figure 3.5 above). Rather than being asked to select the green crayon button, she is being presented with several different color choices.

Clip 3.1. Extract 4.

- 10 SLP: = [yellow:::,] =
11 [((points to yellow))]
12 SLP: = [purple:::,]
13 [((points to purple and then raises her hand to her chin))]
14 child: ((places finger above home icon on bottom right))
15 SLP: ((covers right column of icons with her hand))

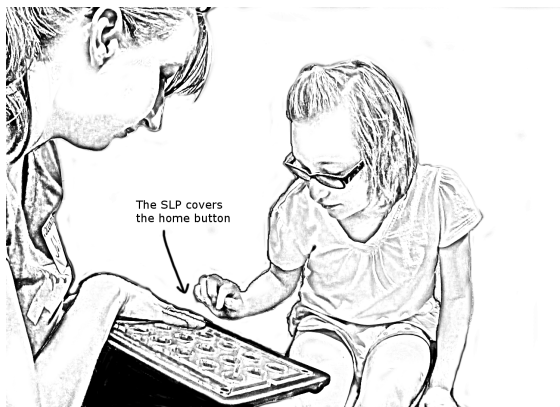


Figure 3.7. Clip 3.1, lines 14 & 15.

Caption: In this screen shot, the child has positioned her finger above the home button on the AAC screen, but she has not touched it. The SLP is using her right hand to cover over the right column of buttons where the home button is located on the AAC screen so that the child cannot touch these buttons.

In Extract 4, the SLP continues to point to and say the name of different colors on the AAC screen (lines 10-12). After she finishes naming colors, she raises her right hand, which she had been using to point to the buttons on the AAC, to her face and rests it on her chin. As clip 3.1 progresses, the interactional assemblage is continually reconfigured by the SLP and the child’s utterances,

gestures, gaze, and bodily position and the orientation of these micro-interactions to the AAC's display. The SLP negotiates the breakdown and the child's initial hesitation to select a button by naming color options that the child can choose. After naming color options, the SLP removes her hand from the screen, opening up all the buttons on the screen for the child's selection. The SLP's question "What color to do want" and her naming and pointing to the colors constrain the activity, projecting a response that indicated a color choice. However, the child responds to the evolving assemblage not by choosing a color, but by moving her finger toward the "Home" button, one of the only buttons on the screen which is not a color button. The child's response works to further negotiate an intersubjective understanding regarding the intersection of the SLP's question, naming utterances and gestures, and the SLP's removing her hand from the AAC screen. The child's raising her hand and hovering it over the "Home" button without touching the button works to verify with the SLP whether this button is a possible action in regard to the communicative assemblage and the activity at hand. The SLP responds to the child's gesture by covering the column of buttons where the "Home" button is located, an action which acknowledges the child's gesture and constrains her possible responses to those buttons that display colors.

This instance of my data constitutes a communication breakdown because the child's response to the SLP's initial question "what color do you want to do", does not conform to the possible responses projected by the question (i.e. she does not respond by selecting a color). The SLP then works to reconfigure the interactional assemblage, adding to her question a demonstration of the child's color options by pointing to several color buttons on the AAC screen while speaking the names of these colors (lines 05-13). The SLP recruits the elements of the AAC device, its images of colored crayons, to repair the breakdown and to work toward an intersubjective understanding of the activity of choosing a color of chalk. Importantly, this instance shows that breakdowns and intersubjectivity are not the work of human intention alone. The AAC system adds unexpected

contributions to the process of negotiation and repair. In addition to color buttons, it contains a “Home” button that the child attends to by positioning her finger over this button. However, the child’s hesitation to touch the home button indicates that she is also attending to the SLP’s reaction to her possible choice, waiting to see if her action aligns with the interactional assemblage the SLP has presented in the prior turns. This interaction illustrates how I identify and analyze instances of breakdown and repair in my data and demonstrates my method for attending to how the sequential and coordinated actions among the various human and nonhuman actants shape the process of breakdown and repair.

Conclusion

In sum, my mixed-methods approach allows me to explore the boundaries, breakdowns, and repairs that emerge in families’ interaction with AAC. In the following chapters, I use this theoretical and methodological approach to explore how the families’ interactions with and experiences of AAC technology form a process of technological adoption.

Chapter 4 : Interactional Fissures and Reconfigurations in Family Interactions with AAC Technologies

Overview

In the previous chapter, I outlined my methodology for identifying and analyzing breakdowns in communication between parents, children, and the AAC technology they use to communicate. Breakdowns in communication occur when gaps in interlocutors' intersubjectivity emerge through interaction. In order to continue with the interaction, interlocutors initiate processes of repair so that they can establish the shared knowledge needed for communication. This chapter provides an analysis of two instances of communication breakdowns that emerged in the data of parent-child interactions collected for this study.

For my analysis, I have divided each clip into multiple extracts to present a close conversation analytic reading of the interaction. In my analysis I trace how micro features of communication such as gaze and gesture interface with features of the AAC devices and objects in the interactional space. My analysis attends to the way that participants respond to each sequential contribution to the interaction, whether it be from human co-participants, the AAC technology, or other material objects. This close analysis helps to show how participants coordinate their interaction relative to each other and to their technologies, objects, and environments, and how each of these elements contributes to the collective process of meaning making. My purpose in focusing on communication breakdowns is to explore how breakdowns reveal the ways that participants interact with each other and their technologies when working to address communication troubles. I show how in situations of breakdown children and their parents use strategies to negotiate misalignments. Ultimately, I argue that communication breakdowns provide agentic opportunities for participants to reconsider their communication strategies in relation to each other, their

technologies, and their environment, and to rework their communicative assemblages to better address the local problems of intersubjectivity that emerge in communication.

Communication Breakdowns

Examining communication breakdowns offers a means of understanding how participants negotiate and solve problems using AAC technology. Conversation analytic work has shown that when breakdowns occur, participants must reconfigure their communication strategies in order to identify and repair the trouble source. One common source of communication breakdown identified in my research is misalignments between parents' and children's goals for a specific communicative situation and differing expectations regarding the role of AAC and its contributions to the situation. For example, in clip 2 in the analysis section below, the mother is trying to encourage her child to use the AAC to name an activity, but the child uses the AAC to assert that it is her turn to do the activity rather than naming it. When the children in my study used AAC, the words and phrases they selected did not always align with the questions or statements their parents posed. When this happens, children's use of AAC technology may be seen as random or lacking in communicative purpose. These evaluations can be harmful if children's ways of communicating through AAC are unvalued or misunderstood. Evaluations about children's communicative competence with AAC which focus on the child's ability to provide expected answers to questions or tasks with the AAC miss the ways that communication is collaborative, negotiated, and collectively enacted. AAC communication is shaped by a variety of factors that can impact its success. Examining breakdowns in communication helps to show how communication is a process of negotiation and how breakdowns result from and are repaired by collaborative negotiation from a variety of actors.

AAC Device Organization

Before beginning my analysis, it is helpful to explain how the AAC systems that the families participating in this project work. The AAC systems are typically organized hierarchically, so that

each page contains sets of buttons that represent either a category of expressions or single expression. For example, home pages usually contain a set of buttons that represent categories or *hypernyms* of words and phrases grouped by topic, context, or some other semantic organizing principle. For example, Family 2's home screen (see Figure 4.7 below) contains a button called "outside". When the user selects this button, the AAC device navigates to the "outside" page which displays buttons associated with activities that the child can do outside such as the "go for a walk" or "hot tub" button. These content buttons, like the "go for a walk" button, are nested as *hyponyms* with the larger *hypernym* category buttons. Although most AAC devices come with sets of standard pre-programmed buttons, AAC device users are responsible for customizing and creating new hypernym buttons and deciding how to group hyponym buttons within the different categories based on a user's particular context and needs. Some hyponym buttons lead to additional pages of hyponyms and some pages may contain both hypernyms and hyponyms. In our interview, the mother of Family 2 explained that it can be challenging to determine how to group different expressions into categories. Furthermore, the association of different words and phrases with certain categories may be clearer to family members, educators, or SLPS than they are to children, so a device's organization and categorization may be a source of confusion for children when they first begin to use AAC systems. Finally, since some buttons are organized in more shallow relationships, these buttons may be easier to find than those that require users to navigate through multiple pages of hypernym buttons. However, some AAC, like the one used in Clip 4.1 by Family 2 provide multiple ways of navigating through pages. For example, the AAC device used by Family two has a "home page" button which allows users to return immediately to the home screen, "navigate left" and "navigate right" buttons, which allow users to flip through all the pages in order of their creation, and a "Go Back" button, which allows users to return to the page they were using prior to the current page.

In addition to organization and categorization, AAC systems' visual representation and audio output are also important components that shape users' experiences with these technologies. AAC device use graphic icons or photographs displayed on buttons to index particular meanings. These visual representations are crucial for children who are preliterate, however, as we will see later on in this chapter, the association between visual representations, their audio output, and the meanings they convey are often not readily clear. Buttons come to take on meaning as they are used within local communicative assemblages.

Analysis

Clip 4.1. "Patty Cake" (F2_DS2_00:00-01:18)

Clip 4.1 has been divided into ten extracts for analysis. The clip was taken from the second data session I recorded with Family 2. Two friends of the child were at the family's home during the data session and one of the friends enters the clip toward the end of the interaction offering to find a toy for the child. The interaction in this clip occurred immediately after I turned on my video camera. In this clip, the mom and child are in their living room; the mom is seated in an arm chair and has placed the AAC device on the side table to the right of her chair. At the beginning of the interaction, the child is pressing the "navigate right" button on the bottom left side of the menu bar on the AAC screen. As she presses this button, the AAC navigates through the pages in the device in the order of their creation. When the AAC device navigates to the songs page (see Figure 4.1 below), the child presses the "patty cake" button and then turns to look at her mom and claps her hands (Figure 4.2). The "songs page" button is located within four hierarchical layers. To reach this buttons the user must first press the "I would like" button from the home screen; next she must select the "games" button from the "I would like screen"; next she must select the "songs page" button from the games page; and finally, she can choose the "patty cake" button on the songs page. However, prior to the interaction in Clip 4.1, the child has been using the "navigate right" button

which would mean that the device is flipping through the pages in order of their creation and not in relation to their hierarchical creation. This seems to cause a problem in Clip 4.1 when the child tries to navigate to buttons from the home page.



Figure 4.1. AAC device songs page.

Caption: Figure 4.1 shows the Songs page on the AAC device. The Songs page contains a two-by-two grid with the buttons “Itsy Bitsy Spider” and “Row Your Boat” on the top row and “Patty Cake” and “Wheels on the Bus” on the bottom row.

Clip 4.1. Extract 1.

- 01 AAC: patty cake
- 02 CHILD: ((turns to mom and claps hands))
- 03 AAC: ((navigates back to home page))
- 04 CHILD: ((steps toward mom))
- 05 MOM: hehe [I'll play patty cake.]
- 06 [((takes child's hands))]
- 07 MOM: okay.
- 08 patty cake, patty cake, baker's man, bake me a cake,

((18 seconds are omitted from transcript))

((During these 18 seconds, the mother continues to clap the child's hands together while chanting the patty cake song))



Figure 4.2. Clip 4.1, line 02.

Caption: In figure 4.2, the child is looking at her mom and clapping her hands. Her mom is sitting in an arm chair looking at her child. The AAC device is sitting on a side table to the right of the mom's chair.



Figure 4.3. Clip 4.1, line 08.

Caption: In figure 4.3, the child stands in front of her mom while her mom holds the child's hands and claps them together. The mom is chanting the patty cake song.

In Extract 1, after the child presses the “patty cake” button and as the AAC device says, “patty cake” (line 01), the child turns to look at her mom and claps her hands (Figure 4.2, line 02). Her gesture, which mimics the clapping activity of the patty cake song, suggests that she connects the “patty cake” button on the AAC with the activity of playing patty cake. The child then steps toward her mom with her hands stretched out toward her mom (line 04), suggesting that she is using her selection of patty cake on the AAC device as means of initiating the activity of playing patty cake. The mom responds to the child's AAC selection and gestures by taking the child's hands and guiding her to play patty cake as she chants the patty cake song (Figure 4.3, line 08). The child's gestures in this extract demonstrate her understanding of the AAC device as a communicative object through which she can initiate or request certain activities or objects. However, as the rest of this clip shows, breakdowns in the process of communicating through the AAC device regularly occur.

Clip 4.1. Extract 2.

- 09 CHILD: ((moves toward mom, extends her arms and reaches toward her mom))
 10 MOM: [what do you wa::nt.]
 11 [((moves hands away from child))]
 12 MOM: tell [me]
 13 [((points to AAC))]



Figure 4.4. Clip 4.1, line 09.

Caption: In Figure 4.4, the child is standing in front of and leaning toward her mom who is sitting in a chair. The child is reaching out her hands toward her mom. The mom has pulled her hands toward her chest away from the child's reach.



Figure 4.5. Clip 4.1, lines 12 & 13.

Caption: In Figure 4.5, the mom is looking at and pointing to the AAC device with her right hand. The child is facing her mom and is holding her hands in position clapping position.

In Extract 2, after the mom and child have just finished playing patty cake, the child extends her arms and reaches out with her hands toward her mom (Figure 4.4, line 09). The mom then asks the child “what do you wa:nt”, emphasizing and extending the vowel in the word “want” while withdrawing her hands from the child’s grasp (lines 10-11). She then gestures toward the AAC device on the table and says, “tell me” (Figure 4.5, lines 12-13). The patty cake game for this mom and child involves the mom chanting the words of the patty cake song while holding the child’s hands and guiding her through different motions associated with different parts of the song. At the beginning of the song, while saying “patty cake, patty cake, baker’s man” the mother claps the child’s hands together. The child’s gestures of reaching out for her mom’s hands immediately after they finish playing the patty cake game suggests that she is trying to recruit her mom to play this game again. To do this, she needs her mother to take her hands and guide her through the motions, so her reaching toward her mother’s hands is readable as a request to play again.

Clip 4.1. Extract 3.

- | | | |
|----|--------|---|
| 14 | CHILD: | ((turns head to look at AAC)) |
| 15 | CHILD: | ((turns to face AAC, leans over AAC, and touches “toys page” button)) |
| 16 | AAC: | [I would like to play with a toy.] |
| 17 | CHILD: | [((leans over AAC as it speaks))] |

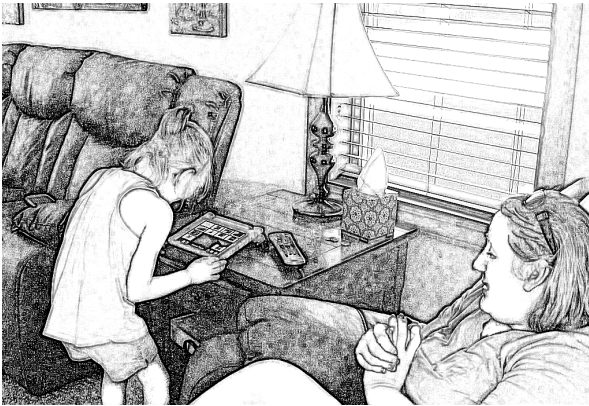


Figure 4.6. Clip 4.1, lines 14 & 15.

Caption: In figure 4.6, the child is standing at the side table facing the AAC device. The photo captures the moment after the child has touched the “toys page” button and while the AAC device is speaking (line 15). While the AAC device speaks, the child bends her knees and leans over the AAC screen so that her face is closer to the screen while she gazes at it (line 16).



Figure 4.7. AAC device home page.

Caption: Figure 4.7 shows the home page of the child’s AAC device which contains eight buttons in two rows across the top of the screen. The buttons on the top row include from left to right: “Bathroom”, “Drink”, “Something to eat”, and “T.V.”. Row two includes the buttons: “Outside”, “My words”, “I would like”, and “Night time”. Row three contains one button: “Toys”. Row four contains two buttons: “School” and “Therapy”.

In Extract 3, the child attends to her mom’s request (from Extract 2) to use the AAC device by turning away from her mom and back toward the AAC device which is sitting on the side table. She leans over the AAC device and touches the “toys page” button on the home screen (see Figure 4.7). As the AAC device speaks the phrase “I would like to play with a toy”, the child continues to lean over the device. She bends her knees and looks at the screen with a sustained gaze (Figure 4.6, line 17). The child’s body position suggests that she is waiting for the AAC to navigate to the toys page screen so that she can make another selection. Her sustained gaze at the device also suggests that she is attending to which button she will press, rather than selecting a random button.

Clip 4.1. Extract 4.

- 18 AAC: ((navigates to toys page))
 19 CHILD: ((hovers finger over AAC and then touches “drum” button))
 20 AAC: [drum]
 21 CHILD: [((looks at mom and claps hands))]

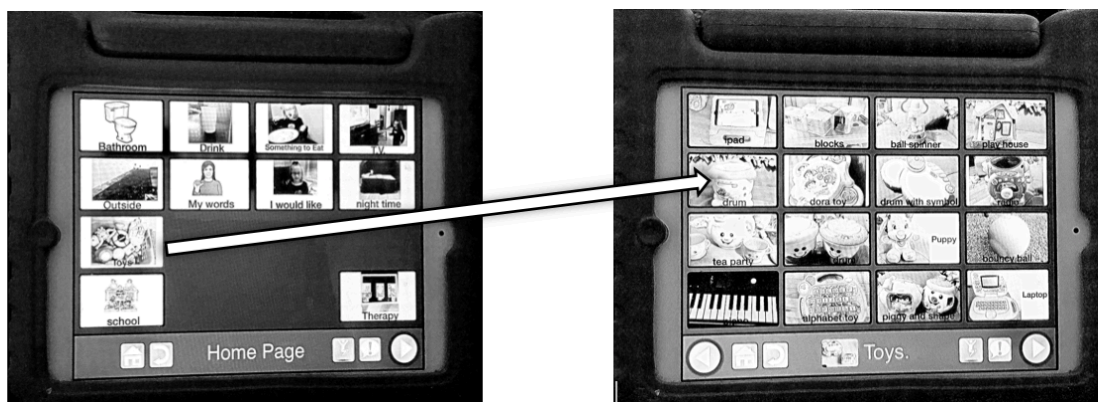


Figure 4.8. Home page and toys page.

Caption: Figure 4.8 shows the home page screen on the left and the toys page screen on the right. The toys page contains a four-by-four grid of buttons each containing photographs of the child's toys. The drum button, which the child uses in clip 1, is the left most button on the second row from the top. An arrow represents the child's navigational use of the AAC device because it connects the "toys page" button on the home screen to the "drum" button on the toys page.

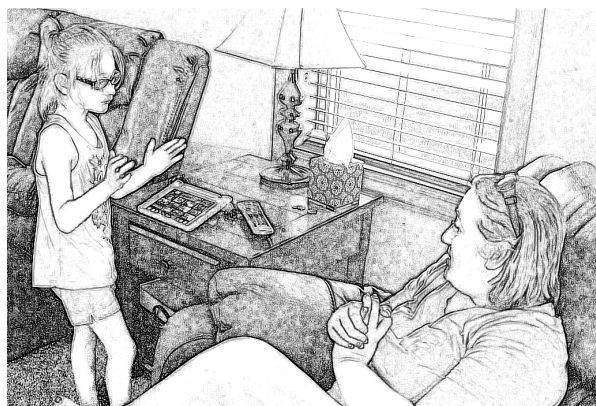


Figure 4.9. Clip 4.1, lines 20 & 21.

Caption: Figure 4.9 shows the child immediately after she has touched the drum button. While the AAC device speaks, the child turns to look at her mom and claps her hands.

In Extract 4, the AAC navigates to the toys page screen which contains 16 buttons each displaying a photograph and the name of one of the child's toys. The child hovers her finger over the left side of the screen where the "drum" button is located for 1.2 seconds and then presses the "drum" button. As the AAC device speaks out "drum", the child immediately turns to her mom and claps her hands—repeating the gesture she performed when she first initiated playing patty cake (Figure 4.2, line 02). Her clapping gesture and her gaze at her mom indicate that she is treating her selection of "drum" on the AAC screen as a communicative selection that requires a response from her mom. Furthermore, her gesture in this extract demonstrates that she distinguishes between the

communicative functions of the different types of buttons on the AAC. She does not treat her selection of the “toys page” button which speaks the phrase “I would like to play with a toy” (Figure 4.6, lines 16-17) as a request for engaging in shared activity because she maintains her body orientation and gaze toward the AAC. However, in this extract, she does treat “drum” as a request or suggestion because she turns to her mom, gazes at her, and claps her hands. The child’s coordination of her gaze and gestures with her selections on the AAC device show how she orients to the communicative potential of the “drum” button differently from the navigational button for the toys page.

Clip 4.1. Extract 5.

22	MOM:	where is your	[drum.]
23	CHILD:		((turns to look at AAC))	
24	AAC:		[((navigates back to home page))]	
25	CHILD:	((moves toward AAC and touches "therapy" button))		
26	AAC:	therapy		
27	CHILD	((continues to look down at AAC while leaning over it))		
28	MOM:	[we're not in therapy right now.]		
29		[((leans toward child))]		
30	AAC:	((navigates to choices page))		
31		(.)		
32	CHILD:	((continues to lean over and look at AAC; touches “programs” button))		
33	AAC:	[I want to do programs.		
34	CHILD:	[((stands up straight and continues to look at AAC))]		
35	MOM:	((raises finger and leans over AAC))		

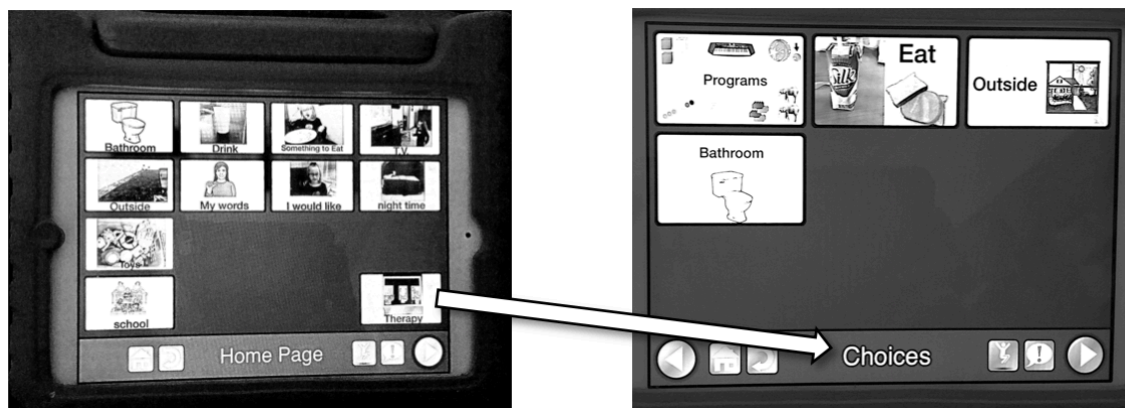


Figure 4.10. Home page and choices page.

Figure 4.10. Home page and choices page.

Caption: Figure 4.10 shows a photo of the AAC's home page on the left and the choices page on the right. An arrow connects the "therapy" button to the "choices" label at the bottom of the choices page to show that when users select the therapy button, the AAC system will navigate to the choices page. The choices page contains three buttons on the top row for "programs", "eat", and "outside", and one button on the middle row for "bathroom".



Figure 4.11. Clip 4.1, line 32.

Caption: In figure 4.11, the child is leaning over and gazing at the AAC device which is sitting on the side table. The AAC device displays the "choices" page and the child is hovering her left pointer finger above the left side of the AAC screen. Her mom is seated in the arm chair beside the table and is resting her arms on the left chair arm while looking at the AAC device.

In Extract 5, the mom responds to the child's choice of drum by asking the child "where is your drum". Upon hearing this question and seeing that her mom does not respond to the child's clapping gesture, the child turns to face the AAC device (line 23). This time she selects the "therapy" button from the home screen of the device (line 25). As the AAC device speaks the word "therapy" (line 26), the child continues to stand in front of the device and lean over it. The child's embodied actions in response to the mom's question ("where is your drum") suggest that she does not want to

play with her drum because rather than looking for the drum or selecting the “drum” button again, she turns back to the AAC device and tries a new strategy, the “therapy” button. The mom responds to the child’s selection of therapy with the utterance “we’re not in therapy”. The AAC screen then navigates to the “choices” page, which is linked to the therapy button on the home screen (Figure 4.10). The child leans over the device with sustained gaze at the screen and selects “programs”, a page that she uses during her in-home therapy sessions (Figure 4.11, line 32). The device speaks out the child’s selection, “I want to do programs” (line 33) while the child continues to look at and stand in front of the device rather than turning back to her mom. The “therapy page” button connects to the choices page, a page which contains four buttons, “programs”, “eat”, “outside”, and “bathroom”. While the “programs” button is used during the child’s therapy sessions, the relationship of the other three buttons on this page to therapy is less direct. The child’s choice of the “programs” button provides evidence that the child has purposefully, and not randomly, selected the “therapy” and “programs” buttons by virtue of their connection. Since she has played patty cake with her therapist, her selection of these buttons may show an association between therapy and playing patty cake. In other words, she may be looking for the patty cake button in the programs page.

Clip 4.1. Extract 6.

36	MOM:	nope (.)	
37	MOM:	[that's (only) like when J and D are here.]
38		((presses left button several times to navigate back to the home page))	
39	CHILD:	((reaches toward AAC while mom is navigating back to home page))]
40	MOM:	what else do you [wanna=]
41	CHILD:	((touches "toys" page button))	
42	MOM:	[=do?]]	
43	AAC:	[I] would like to play with a toy.	
44	CHILD:	((continues to look at AAC))	
45	AAC:	((navigates to "toys" page))	



Figure 4.12. Clip 4.1, lines 37-39.

Caption: In figure 4.12, the mom is sitting in the chair and leaning toward the AAC device which is on the table beside her. She is pressing the navigate left button on the AAC's menu bar, which causes the AAC device to flip through each of page in heirarchial order until the home page is reached. While the AAC flips through the pages, the child looks at the screen and tries to move her hands around her mom's hand to touch the screen.

In Extract 6, the mom intervenes in the child's use of the AAC, saying "nope" and "that's (only) like when J and D are here" while pressing the "left navigation" button. As the mom presses the "left navigation" button, the AAC screen flips through the screens in their hierarchical order until the AAC returns to the home screen (Figure 4.12, lines 37-39). While the mom is flipping through the screens with the left navigation button, the child is trying to move her hands around the mom's hand to touch the AAC device suggesting that she may want to see or touch buttons on the pages that the mom is flipping through. "J" and "D" the mom's utterance "that's (only) like when J and D are here" represent the names of the child's two in-home therapists. This utterance along with her action of returning the AAC screen to the home page suggests that she may interpret the child's selections of "therapy" and "program" as mistakes since the program pages are used for specific activities that the child does with her therapists. Furthermore, the mom may believe that the button that the child is looking for cannot be found under the programs page of the device so she may be trying to redirect the child back to the home page so that she can try again or choose a different activity. However, since the mother uses the left navigation button rather than the home page button to navigate to the home page, she may be looking through the pages to see what

buttons are located where. In our interviews, the mom expressed that she had difficulty determining whether the buttons her child pressed on the AAC represented communicative choices that the child wanted to act on or whether the child was experimenting or playing with the device without the intention to communicate something specific. For example, sometimes in the recorded interactions I observed the child would choose a specific button, like a toy, and then immediately point to a different physical toy in her environment or a different toy button on the AAC, so her mom struggled to determine which toy she wanted. However, the interaction represented in this clip differs in several ways from other instances where the child AAC selections seemed not to match her embodied actions or her subsequent selections on the AAC device. In this extract, the child's actions suggest that she is looking at the AAC screen and pausing between selections—which show attention to what she is selecting. Furthermore, her use of the buttons is not random because she distinguishes between navigational page buttons like the “toys”, “therapy”, and “programs” page and buttons like “drum” which more closely resemble an activity and provide a more appropriate or expected response to her mom's question “what do you want” (Extract 2, line 10). The child's use of navigational buttons show that she is searching for specific buttons and not just pressing any button.

After the mom has navigated the AAC back to the home screen, she withdraws her hands from the device and asks the child “what else do you wanna to do” (lines 40-42). The mom's use of “what else” in her question suggest that the child should choose something else than what she has been searching for or trying to communicate. Before she finishes speaking her question, the child has already selected the “toys” page button again (line 41).

Clip 4.1. Extract 7.

46 AAC: drum
47 CHILD: [((turns to mom and brings hands together in clap position))]
48 MOM: | I don't know where your drum is |
49 MOM: [((stands and moves toward toy room))]
50 FRIEND: I know where it is. ((speaking off screen))
51 MOM: okay, you wanna get it?
52 FRIEND: I'll get it. ((speaking off screen))



Figure 4.13. Clip 4.1, lines 47-49.

Caption: In figure 4.13, the child has just touched the “drum” button for the second time and has turned to look at her mom while clapping her hands. Her mom is preparing to stand up from the arm chair while saying “I don’t know where your drum is”.

In Extract 7, the child navigates to and selects the “drum” button for a second time in this clip and she repeats the clapping gesture (Figure 4.13, lines 47) that she performed in Extracts 1 and 4. It is important to note here that the child uses the “toys page” button the most often of all the buttons on the AAC, but she does not always select the “drum” button. The fact that she has navigated to and selected this button twice suggests that it is not a random choice. Furthermore, her selection of drum is accompanied by the child’s gaze and movement toward her mom and her clapping gesture. The child’s clapping indicates that she is still trying to initiate the activity of playing patty cake with her mom because her gestures mimics the action of playing patty cake and because she performed this gesture at the beginning of this clip when she first pressed the patty cake button (Extract 1). Twice in this clip the child uses her gaze and clapping gesture at specific points in the interaction after she has selected the “drum” button. This shows that her embodied actions

correspond to certain types of communication she is expressing through the AAC. She does not turn to her mom and clap after selecting the “toys page”, “therapy”, or “programs” buttons—all of which represent categorical buttons rather than content buttons. She performs a specific combination of gaze, gesture, and body orientation only after selecting “drum”. Furthermore, the child’s choice of the “drum” button from among the toys page may show that she is connecting the act of playing a drum which involves using hands to tap the drum and the act of playing patty cake which involves clapping or tapping hands together.

The second time the child selects the “drum” button, the mom treats the child’s choice as a request for the drum toy and briefly starts to stand up to find the drum (lines 48-49). At this point, the child’s friend, speaking from off screen indicates that she knows where the drum is (line 50). The mother responds by asking the friend if she wants to get the drum (line 51).

Clip 4.1. Extract 8.

53 CHILD: ((moves toward mom and claps hands once))
 54 MOM: [Is that what you wanna do?]
 55 MOM: [((extends her right hand palm up toward the child))]
 56 CHILD: ((reaches for mom's hands))
 57 MOM: ((flips her hands over so that the palms face down))
 58 MOM: I'm not gonna [play paddy cake unless you tell me.]
 59 CHILD: [((turns toward AAC and claps once))]
 60 CHILD: ((touches "therapy" button))
 61 AAC: therapy.
 62 FRIEND: (just) use her hands because::- ((speaking off screen))
 63 AAC: ((navigates to "choices" page))
 64 ((knocking sound coming from off screen))
 65 FRIEND: (here's her drum) ((speaking off screen))



Figure 4.14. Clip 4.1, lines 53-55.

Caption: Figure 4.14 shows the child standing in front of her mom and gazing at her while clapping her hands. The mom is extending her right hand toward the child.



Figure 4.15. Clip 4.1, lines 56 & 57.

Caption: In Figure 4.15, the child has moved a step closer to her mom and has placed her hands on top of her mom's hands. Her mom has flipped her hands so that they face palm down.

In Extract 8, the child moves toward her mom and claps her hands (Figure 4.14, line 53). She then reaches out for her mom's hands (line 56). First, the mom flips her hands so that her palms face down in a relaxed position while her arms rest on her knees (Figure 4.15). The mother's palm flip makes it so that the child cannot place her hands in her mother's hands and also suggests that the mother is not going to take any action with her hands. The mom interprets the child's clapping gesture as a request to play patty cake as evidence by her utterance "I'm not gonna play patty cake unless you tell me" (line 58) combined with her palm flip (line 57). The mom's gesture shows to the child that she is not going to take the child's hands to play patty cake as she did when the child pressed the patty cake button in the first extract. The child reacts to the mom's utterance and gesture by turning back to face the AAC and touching the "therapy" button again (line 60). At this point, the child's friend begins to talk again off screen (line 61) and there is a knocking sound also coming from somewhere off screen.

Clip 4.1. Extract 9.

66	CHILD:	((touches "bathroom" button))	
67	AAC:	I have to go to the bathroom]
68	CHILD:	((picks up AAC and turns toward mom))	

69 FRIEND: [((walks up to child and mom holding a drum))]
 70 MOM: ((takes AAC with right hand))
 71 CHILD: ((turns around so that her back is to her mom and friend))



Figure 4.16. Clip 4.1, lines 67-69.

Caption: In figure 4.16, the child has just touched the “bathroom” button from the “choices” page (see Figure 4.10). Figure 4.16 shows the child picking up the AAC device while her mom reaches out to take it. The image also shows the back of the child’s friend who has just walk up to the mom and child. The friend is holding a toy drum.

In Extract 9, the child selects the “bathroom” button from the toys page (see Figure 4.10) and the AAC device says, “I have to go to the bathroom”. Half-way through the AAC device’s utterance, the child picks it up off of the table and turns toward her mom. At the same time the child is picking up the device, her friend walks into the room holding a toy drum (Figure 4.16, lines 67-69). The mom reaches out to take the AAC device from the child and the child then turns around so that she faces the opposite direction with her back to her mom (line 71).

Clip 4.1. Extract 10.

72 MOM: [is that the drum you want?]
 73 [((points to drum with left hand while setting the AAC on the table hand))]
 74 FRIEND: ()
 75 CHILD: ((walks toward kitchen and away from her mom and friend))
 76 MOM: (or) are you just bored.
 77 CHILD: ((walks into the kitchen))
 78 FRIEND: don't you want your drum?
 79 MOM: no, I think she just is, .h hitting buttons.



Figure 4.17. Clip 4.1, lines 72-73.

Caption: In figure 18, the mom is holding the corner of the AAC device with her right hand and is setting it on the table. With her left hand she is pointing to the toy drum that the friend is holding. The child has turned away from her mom and friend and is taking a step toward the kitchen.



Figure 4.18. Clip 4.1, line 77.

Caption: Figure 19 shows the child who has walked across the living room away from her mom. She is clapping her hands while she walks and she is close to entering the kitchen.

In Extract 10, the mom points to the drum in the friend's hand and asks the child "is that the drum you want?" (Figure 4.17, lines 72-73), but by this point the child has already turned so that her back is facing her mom and is beginning to walk away from her mom and friend. Although the child has a chance to see the drum that her friend has brought into the room, she does not show signs of engagement with the drum and instead starts to walk away. Her actions suggest that she is not interested in playing with this drum. Although she selected the "drum" button twice on the AAC device, she may be trying to communicate something different when pressing this button—namely that she wanted to play patty cake. This interaction ends when the child stops interacting with both her mom and the AAC device and instead walks out of the room while still clapping her hands. Her walking away from her mom and the AAC device suggests that she has moved on from the activity of trying to communicate through the AAC.

The communication breakdown in Clip 4.1 was never resolved because the child and mother did not seem to reach a state of intersubjectivity regarding the child's selections on the AAC device. However, the close analysis of the video, transcript, and screen capture data presented above can help researchers and participants to better understand the complex ways that users coordinate their

embodied interactions with the contributions of the AAC technology when trying to resolve breakdowns in communication. This analysis first of all shows that the child's gestures, gaze, and body orientation suggest that she is closely attending to her mom's gestures and utterances and that she is engaging with the AAC device in coordinated and systematic ways rather than randomly selecting buttons. When her mom points to the AAC device and says, "what do you want...tell me", the child turns to the device to try to express what she had previously been expressing through her embodied communication. The child's actions show that she understands that her mom is asking her to use the AAC to communicate what she wants to do. Indeed, in the Clip 4.1, the child tried four different times to use the AAC device to communicate with her mom. The clip and extracts above show the child attempting several times to locate an appropriate button to communicate what she wants to do with her mom which seems to be to play patty cake. Rather than using the "patty cake" button, however, she used the "drum" button as a way to communicate what she wanted to do. The child coordinates her embodied interactions—her clapping gesture, gaze, and body orientation—with her selection of the "drum" button in order to add additional meaning to the "drum" button. Her embodied actions show that she is using the "drum" button in a creative and generative way, adding additional layers of potential meaning to the "drum" button as she and her mother negotiate their intersubjective understanding of the activity at hand. Furthermore, an examination of the child's embodied actions shows that the child distinguishes between the types of buttons that are context appropriate responses to her mom's question "what do you want". While her selection of the "drum", "therapy", and "programs" buttons do not seem to match her embodied actions (clapping her hands to initiate playing patty cake), she uses these buttons in systematic ways demonstrating that she has an understanding of the categorical organization of the device. When she touches buttons such as the "toy page" and "therapy page" buttons that lead to additional pages, she does not treat these buttons as a way to initiate activity with her mom as she does with the "drum"

button. Rather, when she presses the “toys”, “therapy”, and “programs” buttons, she maintains her body orientation toward the AAC device leaning over it with a sustained gaze while waiting for it to navigate to the next screen with additional button choices. This close analysis of the child’s embodied actions shows her developing understanding of the AAC device’s organizational system and of the communicative potential of the different buttons in the system’s organizational hierarchy.

In addition to revealing the strategies that the child and mom use when interacting with and through the AAC device, this analysis shows that the breakdowns in communication in Clip 4.1 are not reducible to the child’s difficulty locating the patty cake button. Rather, the breakdown emerges from the confluence of multiple factors and takes on complexity as the interaction unfolds and more variables, such as the child’s selection of the “drum” button, are introduced. The interactional assemblage above includes the embodied elements of the mom and child’s action such as their gaze, gestures, utterances, and body position, as well as nonhuman elements of the interaction, including the AAC device and its properties, the toy drum, and physical space of the interaction as well as other factors. The breakdown in this interaction first emerges when the child tries to initiate another round of patty cake after she and her mom have finished playing. Rather than accepting the child’s embodied actions as sufficient to count as a request, the mom encourages her to use the AAC device to communicate what she wants. It is important to note that the mom is particularly focused on encouraging her child to use the AAC device for the purpose of this study, so my presence and my video-recording also contribute to the interactional assemblage. In their typical interaction, the mom might accept the child’s embodied actions as a request to play patty cake without requiring her to use the AAC to also communicate this desire. The body position and orientations of the AAC and the participants also contributes to the interactional assemblages. The mom is seated in an arm chair and the AAC device is on a table to the side of the chair so that a space exists between the mom and the AAC device. When using the AAC device, the child must turn away from her mom to face the AAC

device, so in a sense, the AAC device is on the periphery of the shared space between the mom and the child and does not have a central place in their interaction. These elements of the physical context converge to create a situation in which the child is transitioning between attending to her mom and focusing on the AAC. In other interactions in my data with Family 2, the device has a more central physical position between the mother and child so that the child and mother can more closely attend to each other and to the device simultaneously. Observing breakdowns can help researchers to better understanding how different configurations of the interactional assemblage may introduce complexities and confusion into the interaction.

The mom's embodied actions and utterances also shape the interactional assemblage. In Clip 4.1, the mom has little physical interaction with the AAC and relies mainly on verbal utterances and gestures to communicate with her child (in other instances in my data she points to specific buttons on the AAC and models its use). In extract 2, when the child tries to initiate playing patty cake, the mom says "what do you wa::nt.", points to the AAC device and says "tell me." The mom's first statement is an open-ended question, meaning that it does not direct the child to a specific answer as a more specific question like "do you want to play patty cake again" would. While producing this utterance, the mom pulls her hands away from the child's reach, preventing the child from taking her mom's hands to communicate that she wants to play patty cake. Her mom's gestures and utterance shape the interactional assemblage along with the physical space of the interaction to create a situation where the child must use the device to communicate, but where she has little direct assistance through pointing or modeling to help her navigate the device. The mom, does in fact, interact with the AAC device directly at one point after the child has pressed the "programs" button. The mom leans over the arm of her chair and the side table to press the "navigate left" button to cause the AAC to return to the home page. At this point, she tries to limit the choices that the child can select on the AAC and tries to reorient the way that child is attempting to find the "patty cake"

button. In addition to the physical environment of the interaction, certain properties of the AAC system could also contribute to the breakdown. For example, to locate the patty cake button as it is organized on this particular AAC device, a user must navigate through at least four buttons and three pages. From the home screen page, the user must select the “I would like” page, and from that page, they must select the game page. From there, they must select the “songs page” button, and from that page they may choose the “patty cake” button. To reach the “toys” page, the child must only navigate through two buttons and one page. The fact that the “patty cake” button is located in a deeper hierarchy of category pages could make it harder to locate. In addition, the child sometimes plays patty cake in therapy, so she may associate this activity with her therapy sessions, and this could be why she selects the “therapy” button twice while looking for the “patty cake” button. These different strategies, objects, and environments constitute a communicative assemblage that is always evolving. The communicative assemblages make certain possibilities for action available and limit others.

Clip 4.2. “Cut it”

The second clip in this chapter, “Cut It” (F1_DS5_C2_16:50), presents a breakdown that emerges as members of Family 1 try to use the AAC device and other objects in their environment for different communicative goals. The data presented in Clip 4.2 comes from my fifth recording session with Family 1. In this session, the mom, dad, and child are playing with playdough at their kitchen counter peninsula. The child is seated in a tall chair and her mom is standing at the table to the child’s left. The dad is standing directly opposite the child at the other side of the peninsula. The AAC device is positioned on the counter facing the child and is propped up with a stand attached to back of the AAC device so that the screen faces the child more directly. Additionally, tubes of playdough and toys for manipulating the playdough were sitting on the counter. In the interaction prior to this clip the family had been using the AAC device to choose colors of playdough, to do

activities with playdough (such as making toast), and to manage turns during playdough activities using the “your turn” and “my turn” buttons. Additionally, the child had been using a toy knife to cut the playdough. At the beginning of this interaction, the mom has found a pair of toy scissors and is holding them in front of the child. Clip 4.2 has been divided into nine consecutively occurring extracts.

Clip 4.2. Extract 1.

01 MOM: ((walks toward child with toy scissors while opening and closing the scissors))
 02 CHILD: ((reaches toward mom's hand with the scissors))
 03 MOM: ((moves her hand with the scissors away from child))
 04 MOM: [what do you want to=
 05 MOM: | ((points to AAC)) |
 06 DAD: [((sets drill down between child and AAC))]
 07 MOM: [=do?
 08 MOM: [((puts hand on drill))]



Figure 4.19. Clip 4.2, line 01.

Caption: Figure 4.19 shows the mom approaching the kitchen counter holding a pair of toy scissors in her right hand. As she approaches, the child, who is seated at the kitchen counter, looks over her left shoulder at her mom.



Figure 4.20. Clip 4.2, lines 06-08.

Caption: In figure 4.20, the dad, who is standing at the opposite side of the counter from the child, has just placed a toy drill in between the child and the AAC device. While the dad still has his hand on the top of the drill, the mom has placed her hand on the side of the drill. The child is looking in the direction of the drill and the AAC device.

As this extract begins, the child’s gaze is directed toward the scissors that her mom is holding (Figure 4.19). When her mom reaches the counter where she is seated, the child reaches out for the scissors in her mom’s hand (line 02). Rather than immediately handing the scissors to the

child, the mom withholds them, moving her hand holding the scissors away from the child (line 03), and instead encourages the child to use the AAC device to communicate what she wants (lines 04-05). As the mom is asking the child “what do you want to do” (line 04 & 07) and pointing to the AAC screen (line 05), the dad places a toy drill on the counter in the space between the AAC device and the child (line 06). The dad’s placing of the drill creates a situation of competing communicative goals. The mom’s aim for the activity, as her question indicates, is to encourage her child to use the AAC to identify that she wants to cut the playdough with the scissors. Meanwhile, the dad’s placing the toy drill in between the child and the AAC device creates a physical barrier to the child’s access to the AAC screen. His gesture also interrupts the mom’s ability to point to specific buttons on the AAC. His placement of the drill also reads as providing an additional toy to use on the playdough—or a possible response to the mom’s question “what do you want to do?”. Before the mom has even finished speaking her question which starts in line 04, she places her hand on the drill while the dad is still in the process of setting it down (Figure 4.20, lines 06-08). The mom’s and dad’s embodied actions create different and competing cues for the child: should she attend to her mom’s directive to use the AAC device to express what she wants to do, or should she play with the drill her dad has placed in front of her and between her and the AAC device?

Clip 4.2. Extract 2. Lines 09-13.

09	DAD:	((removes drill from in front of AAC))
10	CHILD:	「((moves hand with pointer finger extended toward AAC))」
11	MOM:	「((points toward "cut it" button on AAC))」
12	MOM:	°what do you want to do?°
13	CHILD:	((touches "my turn" button))



Figure 4.21. Clip 4.2, lines 10 & 11.

Caption: In Figure 4.21 the mom is looking at and pointing toward the “cut it” button on the AAC screen. Simultaneous with the mom’s pointing, the child has moved her hand under the mom’s hand and is positioning her finger near the “my turn” button on the screen.

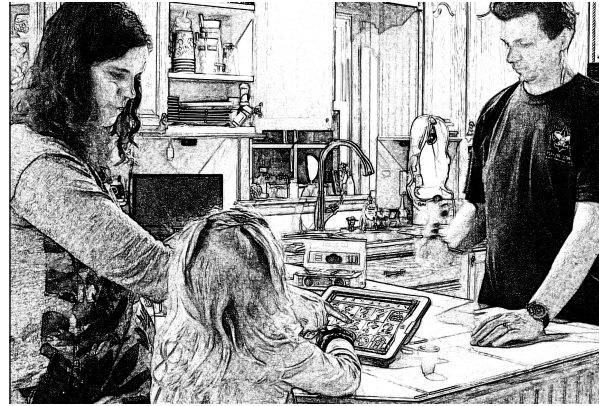


Figure 4.22. Clip 4.2, lines 10 & 11.

Caption: Figure 4.22 shows a different perspective of the interaction in figure 4.23. This image is taken from behind the child’s chair looking over her right shoulder at the AAC screen. From this view, the mom’s finger is shown pointing toward the “cut it” button in the middle of the screen. The child’s hand is positioned below the mom’s hand and is near the “my turn” button.

In Extract 2, the dad responds to the mom’s placing her hand on the drill by removing it (line 09), and the interaction continues without the child’s attending to the drill. After the drill has been removed, the child and mom both reach toward the AAC device at the same time (lines 10-11). The mom points toward the “cut it” button which is in the middle of the AAC screen while the child moves her hand toward the “my turn” button which is on the bottom left side of the screen (Figures 4.21 & 4.22). The “cut it” button shows an illustration of scissors cutting through blue paper with the phrase “cut it” above the graphic. The “my turn” button shows a graphic of two stick figures. The figure on the left has a fleshed colored face and points to itself while the figure on the right is gray. Although the mom’s gesture guides the child to press the “cut it” button, the child simultaneously has already prepared to touch the “my turn” button. Figure 2.22 shows that while the child can see that the mother is clearly pointing to a different button than the “my turn” button, the child still chooses to select this button.

Clip 4.2. Extract 3.

14 AAC: [my turn]
15 MOM: | ((taps her chest)) |
16 CHILD: [((looks at scissors in mom's hand))]
17 CHILD: ((takes toy scissors from mom's hand))
18 MOM: ((reaches toward scissors as if to take them back from the child))
19 CHILD: [((uses both hands to open and close scissors))]
20 MOM: [hehehehe]
21 MOM: [.h w-]
22 MOM: [((takes scissors back from child))]



Figure 4.23. Clip 4.2, lines 14-16.

Caption: In Figure 4.23, the child is looking at and grasping the bottom part of the scissors that the mom is holding in her left hand. The mom is looking at the child and is tapping her chest.

In Extract 3, the child touches the “my turn” button and the AAC device speaks the phrase aloud. The child’s selection of “my turn” does not directly match the form of her mom’s question “what do you want to do” (lines 04 & 12) because it does not specify an activity. “My turn” is not an activity in the sense that cutting or rolling the playdough are, yet this button is included on this activity page on the AAC device, and it does index the action of managing turns in an activity. In this context, the child’s selection of “my turn” is hearable as a creative response to the mom’s question “what do you want to do?”. The child’s selection of “my turn” on the AAC device indicates that she wants a turn to play with the scissors.

After the child has touched the “my turn” button and the AAC speaks the phrase aloud (line 14), she turns to her mom and takes the scissors from her hand (line 17). The child’s selection of

“my turn” and her gesture show her focus on gaining access to the scissors and her understanding of the role of turn taking in social activities. The child had first tried to take the scissors from her mom without using the AAC device (line 02), but her selection of “my turn” in this extract shows her employing the AAC device as a strategy to acquire the scissors from her mom through language. Her response constitutes a strategy for gaining access to an object or item or activity that someone else is controlling at the moment. Furthermore, her use of the AAC device to manage turns with the scissors shows her understanding of the role that language and the AAC device can play in mediating turns and gaining access to objects.

There are several embodied aspects of the mom’s response to the child’s selection of “my turn” which demonstrate that the mom interprets the child’s selection as representing a conversational goal that differs from that displayed in her question “what do you want to do?”. First, the mom does not immediately respond vocally to the child’s selection of “my turn”, and when she does begin to respond vocally, she produces a truncated sound “w-” rather than a word or phrase, suggesting that she hasn’t yet formulated a verbal response to her child’s utterance or gesture of taking the scissors. Her embodied actions show hesitation. She taps her chest, a gesture which references the topic of turn taking which the child has just introduced. The mother’s gesture could be read as a stance on the child’s utterance, suggesting that it is the mom’s turn rather than the child’s or it could be read as an acknowledgement of the topic the child has introduced. After this gesture, the mom allows the child to take the scissors from her hand (line 17), but then immediately reaches for the scissors after the child has taken them (line 18) although she does not take them back from the child until line 22. Before the mom takes the scissors back from the child she laughs (line 20). Her laugh indicates that the child’s response and gestures do not match her expectations for what counts as a response to her question. At the end of the extract, the mother starts to form a [w-] sound (line 21) while taking the scissors back from the child. The mom’s embodied actions

suggest that she is attending to the child's response of "my turn" to her question, and her verbal hesitation and gestures signal a mismatch between her goal of asking the child to identify the action on the AAC device that matches the toy scissors and the child's goal of gaining access to the scissors. The child's response projects a turn taking activity while the mom's question initiates a naming or classification activity by asking the child to identify which button and phrase (cut it) corresponds to the action a person does with scissors.

Clip 4.2. Extract 4.

23 MOM: [your turn to what]
24 MOM: | ((leans toward child; holds scissors in right hand)) |
25 MOM: [((flips left hand palm up and moves it toward AAC))]



Figure 4.24. Clip 4.2, lines 23 -25.

Caption: In figure 2.26, the child is looking at the AAC device while her mom speaks to her. The mom is holding the toy scissors in her right hand and has flipped her left hand so that her palm faces upward while she moves it toward the AAC device.

In Extract 4, after the mom takes the scissor back from the child, she incorporates the child's response "my turn" into her next question, asking "your turn to what?" (line 23). She combines her question with a hand gesture toward the AAC device (Figure 2.24), which serves to reorient the interaction toward using the AAC device to name the action that a person can do with scissors. In this way she acknowledges the child's selection of "my turn" while also emphasizing the type of response that she hopes the child will produce with the AAC device.

Clip 4.2. Extract 5.

26 CHILD: ((looks at AAC))
27 MOM: [what do you want to do.]
28 MOM: |((tilts AAC toward child))|
29 CHILD: [((reaches toward AAC))]
30 CHILD: ((touches "my turn" button))
31 AAC: my turn
32 MOM: I know it's your turn.



Figure 4.25. Clip 4.2, line 29.

Caption: In figure 2.25, the mom is holding the AAC device with her left hand and the pair of scissors in her right hand. The child is looking at the AAC screen and reaching out her hand toward the “my turn” button on the AAC screen.

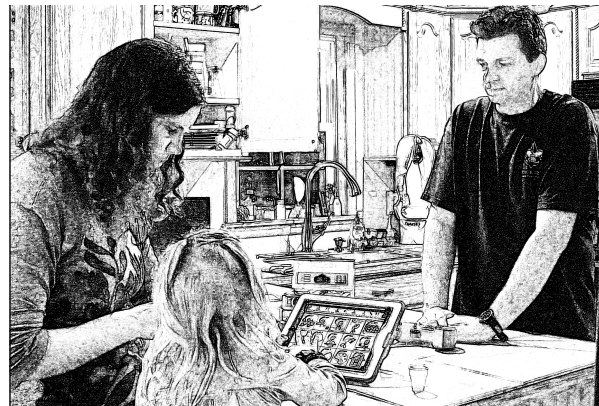


Figure 4.26. Clip 4.2, line 30.

Caption: Figure 2.26 shows a view of the same activity as figure 2.27 but from a camera that is placed behind and to the right side of the child, looking over her shoulder at the AAC screen. From this view, the child can be seen moving her hand in the direction of the “my turn” button.

At the beginning of Extract 5, the mom repeats her original question “what do you want to do” (line 27) and tilts the AAC device toward the child. She does not point to a specific button on the screen. While the mom is asking the question and titling the screen toward the child, the child has already started to reach toward the device (Figures 2.25 & 2.26, line 29). The child immediately touches the “my turn” button again (line 30), and the AAC device speaks out her selection (line 31). After the child’s second selection of “my turn”, her mom acknowledges her selection explicitly by saying “I know it’s your turn” (line 32). The mom’s acknowledgement serves to affirm the child’s goal of gaining access to the scissors. Her acknowledgement may help the child to transition from

using the AAC device to request a turn to using it to name the action that she will do with the scissors.

Clip 4.2: Extract 6.

- 33 MOM: [what do you want to do.]
34 MOM: [((moves finger in a circle in the air while pointing to AAC screen))]
35 CHILD: ((looks at AAC screen))
36 CHILD: ((touches "roll it" button))
37 AAC: roll it.
38 MOM: [↑roll it,]
39 MOM: [((looks around at the toys on the table))]
40 MOM: ((picks up the roller toy))



Figure 4.27. Clip 4.2, lines 33 & 34.

Caption: In Figure 4.29, the mom is holding the AAC device with her left hand and tilting it toward the child. She is using her right hand with her pointer finger extended to draw a circle in the air around the middle of the screen where the “cut it” button is located. While the mom is speaking and gesturing the child is looking at the AAC screen.

In Extract 6, having confirmed her understanding of the child’s goal to have a turn with the scissors, the mom reorients the activity back toward her initial goal by repeating her question “what do you want to do” and by moving her finger in a circle around the buttons on the AAC screen that denote activities that the child could do with the playdough (Figure 4.27, lines 33-34). The mom continues to use both verbal and gestural cues to encourage the child to respond to her question, but in this extract, she does not point out the “cut it” button directly. Following the mom’s question and gesture, the child pauses to look at the AAC screen before choosing a button (line 35). She then touches the “roll it” button and the device speaks out her selection. The mom repeats the child’s

selection with rising intonation (line 38), suggesting that she wants the child to confirm that “roll it” is what the child wants to do. In addition to repeating the child’s selection with rising intonation, she looks around for and picks up the roller toy.

Clip 4.2: Extract 7.

- 41 MOM: [this is the roller]
 42 [((holds roller toy out toward child with left hand))]
 43 CHILD: ((looks at roller in mom's left hand and then reaches out toward her mom))
 44 CHILD: ((turns and reaches toward scissors in mom's right hand))
 45 MOM: ((moves her hand with the scissors to shoulder level; out of the child's reach))
 46 MOM: nope,=
 47 MOM: [=what is this]
 48 |((holds scissors above child's head)) |
 49 CHILD: [((looks at scissors in mom's right hand))]
 50 CHILD: ((reaches with both hands toward the scissors in mom's hand))
 51 CHILD: (m)()
 52 MOM: ((moves scissors out of child's reach and points at AAC))



Figure 4.28. Clip 4.2, lines 41-43.

Caption: In figure 4.30, the mother is holding the roller toy in front of the child with her left hand. In her right hand she holds the scissors. The child is reaching out toward her mom.



Figure 4.29. Clip 4.2, line 45.

Caption: In figure 4.31, the child has turned her body to reach toward her mom’s right hand which holds the scissors. The mom is lifting her hand with the scissor up out of the child’s reach.

In Extract 7, the mom picks up the roller toy, holds it in front of the child, and says “this is the roller”. Her utterance names the roller and connects the image on the button and the word spoken by the AAC device to the material object. The mom’s utterances and the object’s presence combine to provide an opportunity for the child to confirm her selection of the “roll it” button. The child’s response to her mom’s identification of the roller suggests that she does not want to use the

roller and still wants to use the scissors. She initially reaches for the roller (Figure 4.28, lines 41-43), but upon seeing it she changes the direction of her reach toward her mom's right hand which holds the scissors (Figure 4.29, line 44). The mom responds to her child's reach by lifting up her hand with the scissors out of her child's reach and by saying "nope" (line 46). The child's reject of the roller toy is readable to the mother as suggesting that the child may be confused regarding which button on the AAC device matches the scissors. At this point in the interaction, the mom switches her strategy to focus more specifically on identifying the relationship between the toy scissors and the "cut it" button on the AAC device. First, she says, "what is this" while holding the scissors up for the child to see (lines 47-49). The child responds by again trying to take the scissors from her mom (line 50) and by producing a vocal utterance (line 51). The mom continues to withhold the scissors and uses a pointing gesture to direct the child's attention back to the AAC device (line 52).

Clip 4.2. Extract 8.

53	MOM:	[show me.=]
54		[((points to AAC with right hand and grabs AAC with left hand))]
55	MOM:	[=what is this.]
56		[((tilts AAC toward child; points to "cut it" button with right hand))]



Figure 4.30. Clip 4.2, lines 55 & 56.
Caption: In figure 4.32, the mom is holding the AAC with her left hand and tilting it toward the child. With her right hand she is pointing directly to the "cut it" button on the AAC screen.

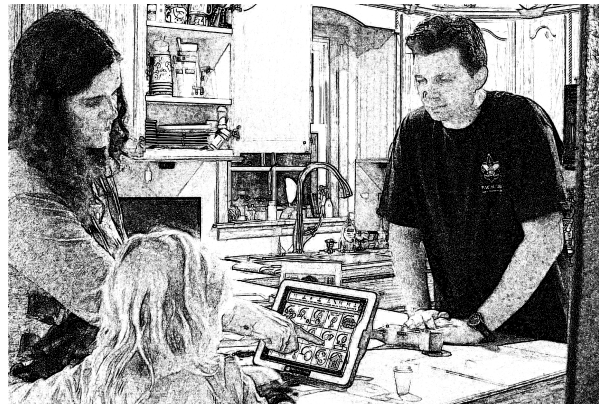


Figure 4.31. Clip 4.2, lines 55 & 56.
Caption: Figure 4.33 shows a view of the same interaction as in figure 4.32 from the perspective looking over the child's shoulder at the AAC screen. From this perspective, the image shows the AAC screen and the mom's finger pointing to the "cut it" button.

In Extract 8, the mom responds to the child's vocal utterance (line 51) by saying "show me" and asking "what is this", and by pointing directly to the "cut it" button on the AAC screen (Figures 4.30 & 4.31, lines 53-56). The mom's utterance, "show me", acknowledges the child's vocalization—the child has vocally expressed something, but now her mother asks her to "show" what she has expressed on the AAC device. In this extract, the mom has shifted her strategies from using an open-ended question "what do you want to do" to using a restricted question "what is this" to which there is only one appropriate answer. Furthermore, the mom combines her question with a gesture that identifies the "cut it" button as the one that most appropriately answers her question. The change in the mom's question to "what is this?" creates a mismatch between the mother's question which projects a name (scissors) and the activity buttons available on the AAC, which denote actions like "cut it" or "roll it". Nevertheless, this mom's verbal and gestural strategies combine to produce a more direct model of the type of communication the mom is encouraging the child to engage in.

Clip 4.2: Extract 9.

57 CHILD: ((looks at AAC and pauses))
 58 CHILD: ((touches "cut it" button))
 59 AAC: cut it
 60 MOM: ((holds scissors out for child))
 61 CHILD: ((takes scissor from mom))
 62 CHILD: cut?
 63 MOM: yes. cut.
 64 MOM: ((holds a piece of playdough in front of child))
 65 CHILD: ((holding scissors with both hands))



Figure 4.32. Clip 4.2, line 58.

Caption: Figure 4.34 shows a view of the child reaching toward the “cut it” button on the AAC screen. As the child reaches toward the “cut it” button with her pointer finger extended to touch it, her mom looks toward the AAC screen.



Figure 4.33. Clip 4.2, line 62.

Caption: In Figure 4.35, the child is holding the pair of toy scissors in her hand as she says “cut?”. She is looking at the AAC screen while speaking. Her mom is looking at the child and reaching toward a toy ice cream cone on the counter beside the AAC device.

In Extract 9, the child responds to the mom’s question and gestures (lines 55 & 56) by pausing before she makes a selection (line 57). In this pause she moves her finger toward the “cut it” button, then briefly moves her finger away from the AAC screen, and finally reaches out again toward the screen and touches the “cut it” button (Figure 4.32, line 58). After the child selects the “cut it” button, the AAC device speaks out the phrase “cut it” and the mom hands the scissors to the child. The child repeats part of the phrase that the AAC device has spoken out, “cut”, with rising intonation (Figure 4.33, line 62) while she holds the scissors and continues to look at the AAC screen. The child’s vocalization with rising intonation is readable as a confirmation request. She could be seeking confirmation from her mom regarding her production of the word “cut” or confirmation regarding the fit between the “cut it” button on the AAC and the action of cutting. Her gaze toward the AAC screen while she says “cut?” suggest that she may still be attending to the “cut it” button. This also indicates that she may be unfamiliar with the button on the AAC and the word or activity it denotes. This may be a new word for her to use on the AAC or to produce, which also implies that the initial mismatch between her mom’s goal and her own goal may be due in part to her unfamiliarity with the different button choices made available on the AAC device and their

meanings. Ultimately, the communication breakdown in Clip 4.2 is resolved through the mother and child's negotiation. Their responses enact different understandings of and stances toward the activity at hand, the AAC buttons, and the objects they are working with to establish. As their interaction unfolds, they develop an intersubjectivity surrounding the scissors, different buttons on the AAC, and the activities that these buttons denote.

Discussion

Breakdowns

The communication breakdowns in the two clips analyzed above resulted from a collection of factors including misalignments between the goals of the different participants, the constraints of the AAC system, participant strategies, and the physical environments among other factors. Breakdowns are often not merely the result of a single aspect of the AAC system or of interlocutors' communication strategies or goals, but rather they emerge from interactions in which various material and social factors are entangled and contribute to the shape of the interaction. The breakdowns in these two clips are not easy to classify or name because they emerge from complex interactions and the nature of the breakdown evolves and changes over the course of the interaction. In Clip 4.1, "Patty Cake", the breakdown in intersubjectivity emerged as the child tries to use the device to communicate what she wants to do (play patty cake). She seems to have trouble locating the "patty cake" button as evidenced by her multiple attempts to communicate through the AAC using different buttons combined with a similar clapping gesture. She chooses the "drum" button twice, which leads her friend to find and bring her a toy drum. The analysis of this breakdown shows how the child is using certain buttons on the AAC in systematic ways and is combining her selection of the buttons with specific embodied actions such as gazing and clapping. Her systematic use of the AAC device reveals the types of distinctions that she is making between navigational buttons, such as the "therapy page" button which transition to new pages, and content buttons, such

as the “drum” button. Analysis of this breakdown shows that the child’s use of the AAC device is not random because she does not react to every button on the AAC in the same way. Furthermore, my analysis shows how the different communication strategies the mom and child use come to shape the direction and form of the interaction and the role of the AAC in the interaction. The child’s use of clapping at various points in the interaction shows her continued motivation toward playing patty cake. The mom’s withholding her hands from the child creates a situation where the child must use the AAC device in order to communicate this motivation. The child furthermore attends to her mom’s gestures and utterances which direct her to use the AAC device to communicate what she wants.

In Clip 4.2, “Cut It”, the breakdown first appears to be related to the mother’s and child’s different goals—the child’s embodied actions and AAC use suggest that she is working to gain a turn with the toy scissors while her mom’s utterances and gestures revolve around encouraging the child to use the AAC device to identify the activity that she can do with the scissors. As the interaction continues, more layers of meaning and materiality contribute to the constraining the shape of the interaction and to redefining the breakdown in intersubjectivity between the mom and child. After the mom acknowledges the child’s selection of “my turn”, she tries to shift the focus of their interaction to choosing the button on the AAC that corresponds to the action that scissors do. However, the child chose the “roll it” button with a graphic image of a roller rather than the “cut it” button with the image of the scissors. At this point, the trouble source shifted from the interlocutors’ competing goals to the child’s understanding of the relationship between the graphics on the AAC buttons and the words, actions, and objects they are associated with. When the child touches the “roll it” button, her actions show that she expects her mom to give her the scissors because she reaches for them instead of the toy roller. The interaction reveals that the child may not yet associate the activity buttons “roll it” or “cut it” with specific actions, words, or toys.

Furthermore, the graphics on the AAC buttons are abstractions that minimally resemble the child's real toys, so the connection between the buttons and their referents may not yet be clear to the child. The participants' interactions enact certain meanings for the buttons, and these meanings are further negotiated by additional interaction so that the meanings of the buttons and their affordances become constrained to specific objects and activities as the interaction progresses.

In addition to the graphics on the AAC buttons, the form of the mom's question may also contribute to the breakdown. The mom poses the question "what do you want to do" several times throughout the beginning of the interaction, attempting to elicit a verb phrase response like that presented by the button "cut it". However, when the child selects the verb phrase "roll it", the mom changes the focus of her question from inquiring about activity to inquiring about the object of the scissors, asking "what is this?" while holding the scissors in front of the child. The mom's first question "what do you want to do" syntactically matched the "cut it" button, but the child does not respond to this connection. When the mom changes her question to "what is this", the "cut it" button no longer matches the question syntactically, but it may connect more directly to the child's knowledge of the scissors object because the child proceeds to produce a verbal response to this question. Although the child's verbal response to the mother's question is not clearly audible on the audio data, the mom responds to her utterance by saying "show me", indicating the child should show the mom what she has just spoken.

Analyzing breakdowns in communication help to show how intersubjectivity is collectively enacted through the contributions of various human and nonhuman actors in the interaction. The human participants' communication strategies including their utterances, gaze, and gestures show their successive response to each new contribution to the interaction, whether it be from the AAC device, an object (scissors or drum), or from another human interlocutor. My goal in this analysis is not to *blame* any particular participant or technology for communication breakdowns, but rather to

examine how breakdowns, which are a typical element of all interaction, occur and are negotiated. These breakdowns offer participants' opportunities to "tinker" with their communication strategies, the AAC technology, and their environments, working out different ways to interact with each other and with the AAC device. Breakdowns also offer researchers spaces to better understand how participants use communication strategies, AAC technology, and other objects to address misalignments in their intersubjectivity.

AAC devices, Drums, Scissors, and Rollers

The role of the AAC device and other objects significantly shape the interaction and contribute in turn to breakdowns and to resolutions of those breakdowns. Objects like toy scissors help children to connect the buttons displaying abstract graphics and words to concrete objects in their local environments. Many AAC programs use systems of symbolic representations where graphic illustrations come to stand for words and phrases. These graphic representations present abstractions of real objects that children know and use. For example, in Clip 4.2, the AAC device's graphic for "roll it" looks different from the child's roller toy. The roller toy is shaped like a paint roller with a single handle whereas the "roll it" button shows a stick figure person using a two handled rolling pin. The relationship between the graphic of the stick figure using a rolling pin and the potential meanings of the button may not be transparent to child users. The child chooses the "roll it" button but her embodied interactions suggest that she wants to play with the scissors. She may be unfamiliar with the "roll it" and "cut it" buttons and the graphic representations do not seem to provide enough information to guide her to choose "cut it" instead of "roll it". When the mom and child use the AAC device in an activity such as playing with playdough, they can more clearly connect the buttons on the AAC device to the toys and activities they are working with in their local environment. Connecting the toy scissors and roller to specific buttons on the device helps to ground the device in their shared physical environment and helps to situate the device as a

tool for distinguishing between certain toys in communication. It also connects the AAC device to the activity that a user can perform with the toy. Likewise, in the case of Clip 4.1 (“Patty Cake”), it becomes clear that the child does not want to play with the drum after her friend brought her a toy drum; the child turned and walked out of the room instead of playing with the drum. Material objects then play a significant role in helping children to link the communication potentials of the AAC to outcomes in their physical and social worlds.

In addition to helping to create bridges between the abstract and symbolic representations on the AAC device, the presences of objects also play a significant role in negotiating communication breakdowns. In Clip 4.2 (“Cut it”), the child had trouble distinguishing between the “roll it” and “cut it” button on the AAC system. She chooses “roll it”, but her gestures suggest that she wants to play with the scissors and not the roller. Because the roller was present in the space, the mom was able to show the child what the roller looked like and help her distinguish between the “roll it” button and the action of the scissors. Elsewhere in my data objects like colored sidewalk chalk, tea party equipment, blocks, shapes, and other objects all mediated between the symbolic representations on the AAC buttons and the buttons’ communicative potentials connecting these buttons to actions that children could do with objects in the real world.

Physical Environment and Bodily Orientation

In addition to the AAC device and objects like toys, the participants environment and the positions of bodies and objects in this environment impact the interactions. In Clip 4.1, the AAC device has been placed on a side table beside the arm chair that the mom is sitting in. The device is not in the shared interactional space between the mother and child, but on the fringe of the shared physical space between the mother and child. To use the AAC device, the child needs to turn away from the mom and face the device. This positioning makes it more difficult for the mom to access the device and for the child to attend to both the mom and the device at the same time. The mom

does not modify the physical positioning of the AAC device during the interaction, but she does lean over to press the “navigate left” button to return the device to the home screen. This physical positioning is not common from this child and parent; in much of my data, the mom is often holding the AAC device in front of the child and pointing to different buttons as she encourages the child to communicate through the AAC. However, in this instance, the child interacts with the device alone while her mother watches. Toward the end of the interaction the child picks up the device and turns toward her mom, a gesture which may suggest that something about the positioning of the device is not working for her in this interaction.

In contrast, in Clip 4.2, the AAC device sits on the table in front of the child and mom. The dad stands on the opposite side of the table and is in this sense cut off from viewing or interacting easily with the AAC screen. The mom and child can see each other’s gestures and interactions with the AAC device and the different buttons on the screen. Throughout this interaction, the mom often tilts the AAC device toward the child to provide the child with a better view of the screen. She also points to certain buttons on the screen to guide the child to answer her questions in the way she deems appropriate. The physical positioning of their bodies and the AAC device on the table create a shared interactional space where they can see each other’s interactions with the device while they communicate. The father in this family is cut off from this shared space with the AAC device, mother, and child by his position at the opposite side of the counter.

Communication Strategies

In the interactions discussed in this chapter, the participants used a variety of strategies to repair communication breakdowns and negotiate intersubjectivity. Their verbal and gestural contributions play a significant part in the unfolding interaction. Participants often reconfigured and changed their strategies as the interaction progressed and as their interlocutors’ responses revealed new information about misalignments between their expectations or interpretations of the

interaction. Although the participants' strategies can be isolated in analysis, it's important to understand their cumulative impact and to consider how the different strategies are working together and are coordinated with objects and the environment to create certain possibilities for action. The way that participants change or adapt their strategies when they negotiate for intersubjectivity and repair breakdowns shows their evolving understanding of the communicative situation and their interpretation of their interlocutors' responses and stances toward the interaction. In Clip 4.1, the mother mainly relies on verbal and gestural strategies to encourage her child to use the AAC device to communicate what she wants to do. She asks the child "what do you want" and points to the AAC device, saying "tell me", but she never points out specific buttons for the child to press. She also moves her hands away from the child's grasp when she reaches for them. Additionally, the mom interacts with the AAC device once in order to return the screen to the home page. In this sense, her actions direct the child to use the AAC device to communication but do not provide any guidance or structure for how the child should interact with the device in order to find the "patty cake" button.

In Clip 4.2, the mom initially tries to ask the same question "what do you want to do?" several times when encouraging her child to use the AAC device to communicate what the scissors do. However, when the child twice selects "my turn" in response to her questions, the mom changes her strategies (Extract 5). The mom acknowledged her child's goal of gaining a turn with the scissors, "I know it's your turn", and shifted to more explicit strategies for directing the child's attention to the "cut it" button. She first draws a circle in the air around the buttons on the AAC that denote actions like "roll it", "cut it", and "squish it". When the child selected the "roll it" button instead of the "cut it" button (Extract 6), the mother picks up the roller so that the child can connect the phrase she had produced with the AAC device to the object in her environment that most closely connects to this button's representation (Extract 7). Next, the mom tries a combination

of even more directive strategies to guide the child to the “cut it” button. She holds the scissors in front of the child, asks the child “what is this”, and points directly to the “cut it” button. This change in the mother’s question topic shows how she begins to account for the possibility that the child is not familiar with the “cut it” button. The child changes her strategies as well. She first tries to reach for the scissors in her mom’s hand. When her mom withholds them, she turns to the AAC device and selects “my turn”. The analysis above shows how both children and parents are constantly changing and reworking their strategies to address new information as the interaction unfolds. These strategies open up certain new possibilities for action and also constrain other possibilities.

Communicative Assemblages

When examined together, it is clear that no single element, the participants, AAC device, objects, or physical environment, is singularly responsible for the direction of the interaction or for the breakdowns and their negations. Rather, the interaction emerges as these different elements are layered together to form specific assemblages which come into being and disperse at different points in the interaction as the participants change their strategies and adapt their contributions to their emerging understanding of the communication at hand. For example, in Clip 4.2, the interaction begins with the mom pointing to the AAC device and asking, “what do you want to do?”. At this point in the interaction, the interactional assemblage consists of the mom’s particular question form and her gesture toward the AAC device, and the AAC device page and all the buttons it displays. However, the child responds to this assemblage by choosing the “my turn” button rather than the “cut it” button. The mom must then reconfigure the assemblage to address this new element that the child has introduced. The various strategies, objects, and buttons change the consistency of the assemblage and create different possibilities for action and response as the interaction unfolds.

Conclusion

In this chapter I've tried to show how examining communication breakdowns helps to show gaps in participants' intersubjectivity. Breakdowns reveal moments when participants expect each other to respond differently. Participants' responses show how they interpret and orient to each other's utterances, gestures, and gaze, as well as how they respond to material elements of their environment that impact their communication. Conversation analysis of video data can help to show how children who do not communicate extensively with verbal speech, like those in this study, use AAC technologies in communicative situations. In Clip 4.1 above, upon first view it may appear as though the child's use of the AAC device is random, and that she has accidentally or unintentionally selected the "drum", "therapy", and "programs" buttons. A close examination, however, shows that she is selecting and using buttons in strategic and systematic ways and that her use of the AAC device is creative and dynamic as she combines her selection of buttons on the AAC with various embodied actions. Without close analysis like this, it may be difficult to determine how the child understands the role of the AAC and its communicative potentials.

Chapter 5 : Usability of the Embodied Human-Technology Assemblage

Overview

In this chapter, I use a posthuman approach to usability informed by disability studies and inclusive design scholarship to explore the usability of AAC technologies in interactions between children with CCNs and their parents. The first half of this chapter address my final research question: What are the implications of this posthuman, interdependent approach to agency in interaction for usability research in technical communication? To answer this question, I first identify current problems in laboratory-based usability testing for understanding how diverse users interact with technologies in local environments. I focus in particular on how TPC scholarship on usability and participatory design addresses issues of exclusion, interaction, and context. Drawing from this scholarship, I propose an approach that figures usability as emergent in interactions of assemblages of human and nonhuman actors. I argue that issues of usability can be understood as collectively generated problems that emerge from local sociomaterial interactions in human-technology relationships.

In the second half of the chapter, I apply the posthuman, interaction based approach to usability developed in the first section to analyze data of Family 2's interactions with their AAC device. I explore how the concept of *affordances* can be used within a posthuman approach to consider how changes in assemblages create on limit possible actions users can take. I then apply this approach to explore data of child-parent interactions with AAC technology, examining how usability issues emerge from interrelations among the child, her mother, the therapist, objects, and the environment. I observe how users' *tinkering* with these human-technology assemblages leads to different affordances or possibilities for interaction. This approach to usability highlights the importance of examining users' interactions with technologies as ecologies or assemblages rather than as a relationship between a single user and a technology. Finally, I argue that this posthuman,

interaction-based approach to usability offers opportunities for valuing and including in TPC work the communicative strategies of people who experience barriers to typical participatory design research methods.

Critical Areas of User-Centered Design and Usability Research

In this section I explore research that addresses two critical needs in user-centered design and usability: (1) research that includes diverse users, particularly users with disabilities and their communities and (2) research that accounts for the increasingly complex contexts and networks of actors that impact usability of technologies. I discuss the ways that technical communication research has worked to identify and address concerns for context and user participation in design and usability research.

Usability and the Ideal User

In addition to expanding usability to address complex users' diverse contexts and cultural systems, disability studies researchers have also focused on challenging the narrow ways that users are defined and involved in technical communication research. When technical communication research includes a narrow range of users for usability tests or fails to fully involve users as co-designers through participatory design, the work we produce reflects an *ideal* or *default* notion of the user (Zdenek, 2018). I use the term *ideal* to denote the influence of the problematic history of the medical model of disability which sought to use statistics to derive an *idealized average* of bodies to which real bodies were then compared and deemed deficient (Grue & Heiberg, 2006). In usability research, designer-centered approaches make use of normative standards of bodies and abilities to determine how users should interact with objects rather than taking account of a wider range of bodily needs and dimensions (Hamraie, 2012). Oswal (2018) explains how the prominent ideology of the medical model of disability positions people with disabilities as deficient and in need of a cure. For TPC scholarship and work, this ideology places the burden of access to technologies on people

with disabilities, rather than on society to work towards more accessible environments. Palmeri (2006) argues that technical communication instructors should teach students to critically engage with notions of the “average user” by asking students to interrogate who is enabled or disabled and in what ways by the texts and technologies they produce (p. 59). This critical approach shifts the focus from designing for a default user to identifying how technologies and text may effectively disable certain users (Oswal, 2018). Likewise, a critical evaluation of how texts, technologies, and usability research enact users helps to illuminate ableist assumptions about who ideal users are and how they interact with technologies and texts. As Oswal (2013a) points out, the design of much digital content and technologies enacts a nondisabled user, for example, one without vision impairments that impact how the user accesses and interacts with the digital technologies. Failing to consider and include the diversity of users that will interact with technologies in the design process positions the needs of people with disabilities as peripheral to design, as something that is supplemental to designing for the ideal user. This positioning invokes the ableist assumption that users with disabilities rather than the technologies, cultural assumptions, or environments are lacking (Oswal, 2013a). Critiquing the notion of a nondisabled user is fundamental for creating an approach to accessible design that does more than offer post-development adaptations. Zdenek, (2018) writes that “a reimagined user in technical and professional communication begins not with normalcy but difference, diversity, and disability” (p. 6). Beginning with difference, as Zdenek suggests, avoids creating a hierarchy of user needs; rather, foregrounding difference, diversity, and disability in usability and design can help researchers to be open to observing and including the different ways that diverse users interact with technologies and texts.

Inclusive Usability and User-Experience Design Methods

Critiquing the default user approach to technical communication must include a critical exploration of our research and design methodologies. Flexible methodologies and testing contexts

are needed to include a greater depth of perspectives and the experiences of people who encounter barriers to participation in usability research in traditional laboratory settings. In his review of accessibility-oriented work in the field of professional and technical communication, Oswal (2013b) argues that technical communication scholars, with their experience in qualitative methodologies, rhetorical analysis, and usability and design issues, have the potential to make important contributions in research and advocacy for accessible content and pedagogy that can improve the experiences of people with disabilities as they use and interact with information and technologies. This section reviews approaches to accessibility and inclusive usability and design research in disability studies and technical communication.

Universal Design (UD) is one of the primary responses in disability studies and design fields to the exclusions of people with disabilities enacted by environments and objects. UD is a design process based on principles that guide designers to consider and address the needs of everyone who might use a product. Initial responses to policies like the 1990 American Disabilities Act resulted in the design goal of accessibility through retrofitting existing environments and technologies to meet the new accessibility standards. Hamraie (2012) argues that in contrast to accessible design, which focuses on adapting technologies and environments to the needs of individual users, UD starts the design process with different abilities and bodies in mind. Disability rights advocates have resisted approaches that aim to achieve accessibility through retrofitting technologies (Oswal, 2013a, 2014; Theofanos and Redish, 2005). Oswal (2014) argues that “While retrofits appear to be a reasonable technical solution, they place the disabled users in the ‘other’ category, push their needs to the margins in the eyes of designers and developers, and continue to encourage investment in often ineffective solutions” (p. 14). When judgements about accessibility are based on designers’ assumptions about what modifications are needed to make an environment accessible, users’ experiences and perspectives are neglected. This can result in technologies that are not accessible for

or desired by people with disabilities (Hutter & Lawrence, 2018). Hutter and Lawrence (2018) describe how designer-centered approaches are entrenched in a technological paternalism model of design that prioritizes the expertise of designers, usability experts, and engineers over the experiences and knowledge of people with disabilities. As an example of technological paternalism, Hutter and Lawrence (2018) explore the SignAloud glove, which translates American Sign Language (ASL) into spoken English. They argue that the glove, which was developed by nondisabled designers, places the “burden of communication” on Deaf people rather than on designers to create a reciprocal communication situation where spoken English might be translated into ASL as well (p. 24). UD attempts to guard against such problems by using different bodies and needs as the starting point of design.

Rhetoric and technical communication scholars have productively aligned notions of *accessibility* with UD approaches. In her book, *Rhetorical Accessibility*, Meloncon (2013) defines accessibility as the “material practice of making social and technical environments and texts as readily available, easy to use, and understandable to as many people as possible” (p. 5). Here accessibility can be understood as a process that operates on the UD principle of designing for everyone rather than designing based on a checklist of standards. This TPC scholarship further seeks to involve diverse users in the design process through participatory design. Dolmage (2005) argues that UD can be practiced as a continuing process of development and adaption to users’ needs in evolving interaction. He argues that usability is an essential component of an ongoing design process aimed at a democratic representation of diverse users and needs. Moreover, this process should, as Zdenek (2018) points out, be part of technical communicators’ design approach at all levels of development and implementation of technologies. Zdenek (2018) writes, “Disability studies in technical and professional communication starts with, and seeks to include at every phase and level, the voices, perspectives, and values of people with disabilities” (p. 5).

Involving technology users in collaborative design is fundamental to creating technologies and texts that reflect users' needs, desires, and practices. As such, usability and user-centered design researchers have explored ways to make usability research more accessible and inclusive for users with diverse needs (Elmore, 2013; Hutter and Lawrence, 2018; Millen, Cobb, & Patel, 2010; Palmeri, 2006; Ray & Ray, 1998). For example, researchers like Elmore (2013) and Millen, Cobb, and Patel (2010) have investigated methodologies for including Autistic children and adolescents in the technology development through participatory design. Elmore (2013) focuses particularly on the importance of including Autistic users in user-centered design for communication technologies. Elmore suggests that an interdependence model of user-centered design is valuable for highlighting the fact that designers and technical communicators should depend on diverse users' perspectives and needs when designing and improving technologies. According to Elmore, creating an interdependent, reciprocal relationship between designers, usability experts, and Autistic users of technology helps to expand perspectives of both users and designers (p. 33). Likewise, Millen et al. (2010) involved Autistic adolescents in participatory design research on an educational technology by modifying typical usability methods to suit different interaction styles and by introducing more flexibility in research design to allow users a variety of ways to access and participate in usability research. Based on research that suggests Autistic children benefit from focused activities, the researchers introduced more structured questions to an open-ended task (p. 94). They found Autistic adolescents were able to substantially participate in developing design ideas and in giving feedback on a video game design through flexible methods that provide multiple modes of structured participation. As this research shows, designers, usability experts, and users with disabilities can collaborate in interdependent design research in order to create technologies that are beneficial to such user groups.

In addition to involving diverse users in the development and testing of technologies and texts, inclusive usability research must explore users' local contexts of use and how technologies and texts fit into users' existing social, cultural, and material networks. Hutter and Lawrence (2018) argue that focusing exclusively on the "functionality of the product without attention to the social, cultural and historical contexts of users" creates a situation where "discriminatory behaviors are inscribed in our testing practices" (p. 21). They advocate for critical attention to the methods that usability practitioners and researchers use and the ways that these methods may exclude certain users. They further argue, "Conducting usability testing as though a product exists in a vacuum, without attention to cultural dimensions of a user's context, can be susceptible to cultural appropriation" as in the case of the SignAloud glove (p. 24). Because the designers did not consider the culture of the Deaf community or involve deaf participants in their technology design process, they appropriated the language of the community, ASL, for a technology that is primarily useful to a nondisabled, hearing audience rather than for the Deaf community (Hutter and Lawrence, 2018). Understanding users' and their communities' cultures also includes exploring the ways that technologies and texts are integrated into users' networks and the factors that impact this integration. Elmore argues that technical communicators should broaden their usability scope to include user support networks, as well as environmental, social, and financial factors that impact Autistic users' experiences with technologies (p. 17). TPC research needs to expand the scope of usability to not only address users' access to an environment or object but also to explore the interrelations of users and technologies within local environments.

In sum, inclusive usability and user-centered design should include at every stage in development participants with various needs, bodies, and interaction styles, particularly those users with disabilities who have been historically marginalized by design research that enacts a normative user. In addition, to better understand the ways that diverse users interact with technologies,

designers must involve users, particular marginalized users, in a collaborative design process and must explore the social, cultural, and material factors that impact the usability of technologies in users' local environments. In regard to this research project, these insights emphasize the need to explore the ways that children with CCNs interact with AAC technologies and their conversation partners in their local environments. As some of these children—like the children participating in this project—are not yet literate and cannot produce extensive verbal or signed speech, they are excluded from many of the traditional usability and participatory research methods. Moreover, examining the usability of AAC technologies in laboratory settings with individual users negates the ways that AAC devices are used collaboratively through the joint interactions of children and their families, friends, educators, speech language pathologists, and other conversation partners. Approaching usability as an interdependent relationship between users, their culture, and environment helps to illuminate the ways that people and their environments come together to create certain possibilities for action through AAC.

Contexts and User Networks

In addition to creating more inclusive approaches to usability and participatory design research, there is a critical need for usability research that explores how users interact with technologies in sociomaterial practices in local environments outside of the lab. The need for this research is reflected in recent Technical Communication scholarship that has called for researchers to expand our notions of context and adapt our usability and design methods to better address the increasingly complex environments into which technologies are incorporated and the localized needs of diverse users and communities (Agboka, 2013; St.Amant, 2018; Spinuzzi, 2001). Kirk St.Amant (2018) writes that “The settings—or context—in which we use items greatly affects what constitutes a usable design” (p. 4). Usability research conducted in laboratories often focuses on identifying problems that independent participants have while using technological artifacts to accomplish

specific tasks predetermined by usability researchers. According to Spinuzzi, typical usability methods “tend to focus on how individual users employ isolated products in controlled settings” (Spinuzzi, 2001, p. 43). In cases where users interact with technologies independently from other humans or objects, this approach to usability makes sense. However, as usability expands to explore texts and technologies beyond those produced and used in isolation, more ecological approaches to usability are needed. In the world outside of the lab, technological artifacts are increasingly being used in joint interaction between multiple participants in complex environments. The presence of multiple users interacting simultaneously with technologies and each other indicates that the interactions users have with technologies and texts are socially and culturally based and more complex than those simulated in usability labs. Usability research often depends on predesigned scripts, sets of questions, or tasks that determine the types of interactions users will have with the technological artifacts under investigation. These predetermined tasks may hinder usability researchers from identifying unintended or unexpected uses or consequences of human-technology interactions. Current laboratory-based usability practices fail to address the complex environments and multiparty interactions many texts and technologies are engaged in outside of the confines of the lab.

Usability in Human-Technology Assemblages

Exploring users’ contexts—their cultural and material environments—and their interactions with technologies within these contexts are fundamental for developing better understandings of usability. As I argued in Chapters 1 and 2, posthuman approaches to agency are useful for considering how possibilities for change and action emerge from the interactions of both human and nonhuman actors within assemblages. Given this argument, it follows that usability research should extend its purview to users’ networks outside of usability lab. In laboratory-based usability research, researchers often ask participants to complete a set of tasks using the technological

artifacts under investigation in order to identify problems these participants might have with the intended uses of these technologies. In this context, researchers use an independent-user-model, where users interact with technologies independently of other participants or technologies. This model is appropriate for testing technologies designed to be used in isolation from other humans or technological artifacts. However, this model's validity is weakened when it is used to test technological artifacts that are used in social settings where people interact with each other and with other technologies or objects. In such situations where multiple parties interact through and with technologies, patterns of usage emerge through human-technology interaction in conjunction with human-human interaction. Such interaction cannot easily or reliably be simulated in a laboratory setting because it emerges from social, cultural, organizational, and material norms situated in local contexts (Jaspers, 2008; Gouge, 2016; Heath & Luff, 1991 and 1993). To address this concern, I argue that scholars and practitioners should consider taking usability research out of the lab and into to these complex, multi-party contexts of use in order to better understand how multiple participants interact jointly with technologies.

The task-based scripts used in laboratory-based usability also limit the scope of issues that testers identify. Task-based scripts focus primarily on the intended uses imputed to texts and technologies by designers, technical communicators, or usability experts. Although assessing the ways that information and technologies meet the purposes they are designed for is extremely important for making technical improvements, by focusing exclusively on these intended uses, usability practitioners may fail to notice evolving patterns of use based on users' local needs, environment, and interactions and the unexpected contributions that technologies and texts introduce in interaction (Agboka, 2013; Bellwoar, 2012; Gouge, 2016; Rivers & Söderlund, 2016). As Bellwoar notes, many of the creative and 'unorthodox' uses of technological artifacts fall outside of the boundaries of laboratory-based studies:

This examination of already-made worlds is not enough to understand how people are using products because it assumes that people intend to inhabit already-made worlds, when in fact they intend to remake their own worlds using the technologies along with the other official and nonofficial texts and professional and nonprofessional people whom they tie with those technologies. (p. 343)

Task-based methods limit participants to a script and set of tasks predesigned by researchers, restricting the scope of usability issues that researchers observe. For example, in her field research in hospitals, Gouge (2016) found that patients were confused about home care instructions on hospital discharge forms in part because the forms were not designed to accommodate the evolving needs of clinicians and patients in dynamic interaction. The instruction forms needed to be modified to allow space and opportunity for clinicians to record their in-the-moment instructions and advice for patients that arose from their conversational interactions in the patient discharge process. When describing how patients and clinicians improvise hospital discharge instructions forms in local interactions, Gouge (2016) writes that “each transitional care communication event is an intra-active (Barad, 2007) performance, an enactment that cannot be fully scripted in advance: Details are supplied; annotations are made; sometimes things are underlined, checked, X-ed, and crossed out; things are said; questions asked and answered orally” (p. 7-8). Usability tests that examine autonomous users interacting with the discharge instruction template would miss the ways that these templates fail to adapt to the interactional, sociocultural, and material factors introduced by their use in the hospital and not the usability lab.

This research demonstrates the importance of examining alternative and unintended uses of technological artifacts and illuminates the need to take a critical approach to the tasks and intended uses created through usability testing scripts. Observing how users interact with technologies in complex environments outside of the narrow constraints of scripts and tasks would help researchers

to balance the needs and perspectives of developers and technical communicators with the needs of end users. This approach would also help usability researchers to better understand how users incorporate multiple resources or actors into their interactions with technological artifacts and how the social and cultural practices of users' local environments also impact the usability of technologies. Neither users nor technological artifacts act alone in order to accomplish tasks or goals, but rather they interact in complex relations with other users, texts, and technologies. For families like those participating in this study, ecological approaches to usability could help to bridge gaps between narrow technical descriptions of AAC in user manuals and the challenges families face when integrating AAC into their communication practices and local environments.

Distributed and Posthuman Approaches to Usability

Recognizing the challenges of laboratory-based usability research, some TPC scholars have called for more ecological approaches to human-technology interactions (Bellwoar, 2012; Gouge, 2016; McNely & Rivers, 2014; Rivers & Söderlund, 2015; Spinuzzi, 2001; Teston, 2012). Ecological perspectives on human-technology interaction necessitate decentering the individual human participant in favor of approaching technology use within broader networks of social, cultural, political, and material actors. This ecological perspective has largely been explored in TPC scholarship through two theoretical frameworks: genre ecologies (Spinuzzi, 2001) and new materialist theory (McNely & Rivers, 2014; Rivers & Söderlund, 2015). First, in his research on workplace technical communication, Spinuzzi (2001) argues that usability is better understood as distributed across a network of genres, or a genre ecology, where users are constantly adapting their patterns of use based on the interactions of different genres in the system. Spinuzzi explored how workers used and adapted an information database of traffic accident reports in Iowa in coordination with other objects such as maps and punch cards. He writes that “workers continually adapt new genres, bringing them into the ecology to help them use the database” (p. 48). This

continual adaption means that genre ecologies are always changing and evolving as people adapt them to new activities and objects. Usability, for Spinuzzi, is “located in mediational relationships among genres” rather than isolated in particular components of a technology or information system (p. 56). This significant insight implies that usability is *distributed* across the networks of actors, objects, and activities that technologies and texts are integrated into. What makes a technology or text usable is more than technical features or isolated user practices. Scholarship that draws from new materialist theories have made similar observations. As discussed in Chapters 1 and 2, a key assumption of posthuman theories is that nonhuman entities “are not simply projections by, containers for, or artifacts of human activity: not fetishes but actors” (McNely & Rivers, 2014). Drawing on Latour’s (2005) Actor Network Theory and new materialist scholarship of Karen Barad, Donna Haraway, and others, TPC scholars have explored the ways that material objects and humans act in relation to each other and how these interactions produce change in usage. As such, new materialist oriented TPC scholarship frames usability as emergent in networks of actors. This approach to usability seeks to challenge researchers’ prioritization of human design and intention in human-technology relationships by attending not only to human prescribed uses of technologies but also to “the agentic capacities” of technological artifacts in complex assemblages of interactions (McNely & Rivers, 2014). New materialist theories challenge usability methodologies that isolate technological artifacts to narrow task-based interactions with independent users. Rather, new materialist approaches to human-technology relations focus on the rich, complex, and dynamic contexts and interrelations that impact human technology interactions. In this section, I explore how materialist approaches to usability and communication design in TPC literature addresses the ethical, methodological, and theoretical concerns for inclusion, context, and interaction raised in the previous sections.

Approaching usability as situated in ecologies of interaction has implications for how we understand human-technology relationships and the semiotic-material practices that emerge from such interactions. As McNely and Rivers (2014) argue, “User experience and communication design may be improved and made more robust through practices and heuristics that unconceal the complex assemblages in and through which human users move.” Applying new materialist theories to usability allows practitioners to extend their purview beyond technical challenges that occur when a person uses a technology for a prescribed task. Under a new materialist paradigm, scholars explore human-technology interactions as assemblages that are made to work or fail to work based on relations among the various actors in a network (Latour, 1991). This theoretical shift necessarily introduces more complexity into usability testing scenarios as researchers must now account for relations among a collection of users, technologies, semiotic material practices, and contextual factors, but as Rivers and Söderlund (2015) argue, it provides a valuable and nuanced perspective on usability that extends beyond the scope of the laboratory.

In addition to viewing usability as resulting from networks or ecologies, new materialist approaches allow researchers to be more attentive to unanticipated usability concerns that emerge when technologies are integrated into complex, multiparty environments. Namely, a new materialist approach to usability encourages scholars and practitioners to consider how agency emerges from interactions among actors in a network where objects are dynamic collaborators in or inhibitors to achieving tasks rather than mere tools for prescribed ends (Rivers & Söderlund, 2015). McNely and Rivers (2014) critique approaches to usability that position “users as firmly in control and qualitatively different from the tools and technologies at their disposal.” Positioning technologies as *also* agentic in interaction can help researchers assess the unintended or unanticipated ways that humans and technologies interact, or what McNely and Rivers (2014) describe as the impact of “missing masses.” For McNely and Rivers (2014) *missing masses* are nonhuman entities that are often

positioned as passive by usability approaches that prioritize human intention and goals. McNely and Rivers argue that nonhuman entities are collaborators in the organization and enactment of usability. Likewise, in theorizing a “speculative usability,” Rivers and Söderlund (2016) argue for moving beyond a human orientation of usage in order to consider the uncertainties that nonhuman entities introduce in theories of usability. In other words, speculative usability asks researchers to explore the unexpected and accidental uses or functions of technological artifacts as they emerge in relations not only with humans but also with other technologies or objects. Rivers and Söderlund write, “The speculative part of such an operation is imagining or experimenting with how an object could take on different relations to achieve different functionalities” (p. 15). Thus, new materialist approaches to usability help to open up possibilities for use and intervention based on creative, evolving, and unanticipated uses that emerge when technologies are integrated into complex ecologies of human and nonhuman actors.

Several TPC scholars have already theorized frameworks for operationalizing new materialist principles in usability testing and communication design. McNely and Rivers (2014) provide three design moves that help to put into practice a new materialist framework for communication design: “accounting for the missing masses, designing for flat ontologies and radical symmetry, and designing for interagency.” When designers and technical communicators account for missing masses, they must consider how nonhuman entities will interact with the technological artifacts they create. For example, McNely and Rivers (2014) explore how apps for farmers can help farmers to identify the nonhuman actors—such as elements of weather, soil conditions, and equipment—that impact the work or farming in particular contexts. The authors argue that design work that accounts for nonhuman impacts can help users to better negotiate their needs within complex assemblages of actors. Similarly, Rivers and Söderlund (2015) argue that this accounting for missing masses should also include exploring the unanticipated uses and functions of technological

artifacts. In addition to locating missing masses, new materialist approaches to usability and communication design emphasize Latour's (2005) notion of radical symmetry between human and nonhuman actors in a network. Radical symmetry posits that humans and nonhumans are equally capable of impacting each other and equally capable of shaping usability. Finally, interagency recognizes the way agency or change is distributed among various human and nonhuman actors in a network.

Agency, a primary issue this dissertation explores, is an important concept for usability testing and research because it speaks to how power and the capacity to make changes in human-technology relationships is distributed. A human intention oriented view of usability positions humans as the sole agents. Under a posthuman framework, agency is not the sole possession of human technology users, developers, or testers. Rather, on a new materialist paradigm, agency emerges through interactions or patterns of use. A new materialist conception of usability allows us to ask how and where problems in these ecologies arise, and how our human-technology assemblages may be reconfigured to better address users' needs.

Usability and Interdependence

This posthuman approach to usability aligns with the disability studies scholarship on interdependence and agency discussed in Chapters 1. As discussed in chapter 1, disability studies scholars have argued that all humans, both people who are nondisabled and disabled by society and environments, have complex interdependent relationships with technologies. However, people with disabilities are often framed as gaining independence from technologies whereas nondisabled people are not positioned in this way. Foley and Ferri (2012) write, "The belief that technology affords greater independence and an ability to transcend the body, run counter to disability studies scholars, and activists who have insisted that interdependence and different ways of being in the world should be perceived as equally valid" (p. 195). In popular and commercial rhetoric, the notion of

independence often reflects an idealized or normative standard grounded in ableist assumptions about how life should be lived. Disability studies scholars insist that constructs like autonomy and independence—which are often used as standards for human-technology relationships for people with disabilities—can be misleading because they obscure the complex, interconnected reality of all human-technology relationships (Gibson, 2006). In the context of disability, Gibson argues that “the goal of independence limits desire and the appreciation of connectivity. It reinforces disability as limitation rather than possibility and thus may contribute to legitimizing the repressive systems that exclude disabled people” (p. 190). Instead of working toward a monolithic standard of independence based on ableist views of normal bodies, disability studies scholars advocate for an approach to technology use that embraces the users’ different bodies and that is localized to the specific needs of users’ contexts and networks, not based on idealized norms.

Disability studies’ emphasis on exploring the interdependences of human-technology relationships implies that inclusive usability research should account for the complex relationships and environments into which technologies and texts are integrated. Usability research should seek to understand how changes in these relationships and environments affect the usability of technologies and texts. A posthuman approach to usability which turns our focus to the local interrelations of various actors can help us to better account for these interdependences. Under this approach, usability emerges from interactions within networks of actors. A posthuman usability examines how technologies interface with users as well as with objects and environments. The relations, missing masses, social practices, and material configurations of users’ environments impact the usability of technologies. Expanding usability to explore users’ interactions and environment allows us to focus not only on reconfiguring technological features, but also on reworking the assemblages and interactions that shape the usability of a technology or text.

Usability as Affordances of Embodied Assemblages

In this section, I explore usability of AAC technologies as emergent in the interactions of assemblages of actors. I draw on discussions inspired by Gibson's (1977, 1979) notion of affordances and constraints in design (Norman, 1999, 2013), sociology (Hutchby, 2001), Human Computer Interaction (Sun & Hart-Davidson, 2014) and rhetoric (Fountain, 2014) to develop a theoretical framework for exploring usability as emergent in interactions of complex assemblages.

The notion of technological affordances originated with the psychologist James Gibson and has been theorized in different fields in different ways. Sun and Hart-Davidson (2014) write that Gibson (1979) coined the term *affordance* to “describe a three-way relationship between the environment, the organism, and an activity” (p. 3534). Drawing on Gibson's definition of affordances, Norman (2013), in his book *The Psychology of Everyday Things*, characterizes an affordance as emergent in relations between an object and a user: “An affordance is a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used” (p. 11). Norman (1999) makes clear that affordances are not the physical or virtual design features such as door knobs or menu bars, but rather the possible actions, such as opening a door, that a user can perform with in relation to specific design features. Hutchby (2001), whose book *Conversation and Technology* concerns the role of technology in communication, contrasts the notion of affordances of objects or technologies with the strong social constructionist position that the qualities or characteristics of objects are always defined or interpreted by sociocultural forces, and therefore, do not exist prior to the discourses that brings them into being. For Hutchby, technologies have particular material characteristics that *afford but do not determine* the possible ways that users may interact with these artifacts. He explains, “We are able to perceive things in terms of their affordances, which in turn are properties of things; yet those properties are not determinate or even finite, since they only emerge in the context of material encounters between actors and

objects” (p. 27). On this view, the characteristics of material objects, or of ideas, or other actors become relevant through local interactions. In this way, context and sociomaterial interactions shape possibilities for acting with technologies—or affordances. Affordances arise from interactions among users, their practices, objects, and their environment.

Norman uses affordance as a means to consider the extent to which users working with technologies are able to perform specific activities conceived of by a designer’s conceptual model. He writes that “Affordances specify the range of possible activities, but affordances are of little use if they are not visible to the users. Hence, the art of the designer is to ensure that the desired, relevant actions are readily perceivable” (p. 41). Norman’s characterization of affordances has been critiqued by Human Computer Interaction scholars like Sun and Hart-Davidson (2013) who seek to extend the notion of affordances to examine the ways that human-technology interaction enables social power. Sun and Hart-Davidson (2014) write that “social affordances arise out of instrumental affordances through user’s interactions in local contexts, and thus the same instrumental affordance might lead to different social affordances and support different social uses when affordances are realized in different contexts” (p. 3538). For Sun and Hart-Davidson (2014) affordances are not value-free but emerge from relations of power and agency within users’ networks where “some groups of users are privileged while some might be ignored, marginalized, or even oppressed” (p. 3538). For example, they consider how the affordances that emerge from blind users’ interactions with a text-only website extend beyond the design features of the site and the users’ needs. The text-only site they consider was developed to address accessibility issues in the organization’s original website. The researchers found that the text-only site was developed as a separate site and lacked the same maintenance and updates the organization’s main site received. What the website affords blind users is different and not equal to that of nonblind users, not merely because of its design features, but also because of the power distribution of resources and the design practices that privileged

nonblind users' needs over those of blind users. Sun and Hart-Davidson (2014) argue that attending to the social affordances as well as the technical or instrumental affordances of technologies can help researchers to bridge the concern for local user interactions with the larger social impacts of technology use. The notion of social affordances implies that researchers should consider how social inequalities and power relations impact the usability of technologies and texts.

Fountain (2014), in his book *Rhetoric in the Flesh: Trained Vision, Technical Expertise, and the Gross Anatomy Lab*, brings together discussions of embodiment, multimodality, and affordances to explore how students in anatomy labs learn to develop a “trained vision” of anatomy through their interactions with objects and each other in the lab. Fountain found that *trained vision* is enacted in the various multimodal practices of the lab as students work with cadavers and training aids such as whiteboards or diagrams. Fountain writes that “we enact an object’s affordances through our intentional interactions with them in settings saturated with social and cultural meaning” (p. 91). Fountain argues that the multimodal teaching tools used in the anatomy lab do not merely transfer information to students as in a transactional model of communication; rather students come to develop a trained vision through their embodied interactions with objects in specific cultures. Fountain writes,

We enact an object’s affordances, which are opportunities for action that emerge from the mutual contact between the object-ness of the object and our bodily capacities for perception, movement, interpretation, and meaning making. Affordances of displays and objects are not as much perceived as they are enacted or made through our purpose-driven interactions with them. Affordances are enacted through the body-object-environment assemblage. (p. 92)

According to Fountain, an affordance is not a particular property of an object, but rather the possibilities for action that emerge from interactions among people, the objects they interact with,

and their environment. Likewise, the usability of technologies and texts, like the usability of multimodal teaching tools of the anatomy lab, are not transactional but rather enacted. Usability regards the degree to which users can conduct certain tasks with technologies or objects with ease, but Fountain (2014) reminds us that users' process of conducting tasks is shaped by the affordances or the possibilities for action that are brought into being through interaction in specific "body-object-environment-assemblages". Usability is actively negotiated and collaboratively shaped through interactions. By examining users' local interactions with technologies, we can better understand how the usability of an object emerges and how different interrelations of the body-object-environment-assemblage afford different opportunities for agentic action for users.

This chapter considers how the usability of AAC technologies can be understood as emergent in users' interactions in their local environments. In this approach, I operationalize the concept of affordances as possibilities for action that are brought about through the embodied interactions of users and AAC technologies in local environments. I explore how users' interactions with each other, their technologies, and environment enact different affordances. By tinkering with technologies, their communication strategies, and environments, users reconfigure their networks, and different affordances emerge from these reconfigurations. Hutchby (2001) writes, "when people interact through, around and with technologies, it is necessary for them to find ways of managing the constraints on their possibilities for action that emerge from the affordances of given technological forms" (p. 30). Exploring users' interactions with technologies in their local environments helps to show the challenges and breakdowns that arise in their interactions as well as to show how users address these challenges. This approach to usability addresses the challenge identified by St.Amant (2018) for technical communicators to expand our contexts of usability and user-centered design research and signals that the usability of technologies requires more than knowing how users interact in isolation with specific features of technology.

In addition to addressing the need to explore usability as emergent in complex networks and contexts, this approach to usability can contribute to the need for more inclusive research regarding users' relationships with technologies. As previously discussed in this chapter, there is a great need for usability and user-centered design research to challenge notions of the default nondisabled user and to include diverse users in the design process through participatory design research.

Participatory design researchers have demonstrated the need for adapting our usability and user-centered design methods to include and enable diverse users such as Autistic adolescents to take part in the design of technologies (Millen et al., 2011). While the usability approach presented here does not include typical participatory methods, it does present a possibility for children who experience CCNs to demonstrate how they interact with technologies in their local environments. Since the children in this study are not yet literate, are just beginning to learn to use AAC to communicate, and experience cognitive differences and challenges, they face barriers to participating in methods used in inclusive participatory design research that might ask users to designing an educational game or answer questions regarding what they like and dislike about technologies. Examining how young children with CCNs interact with technologies in their local environments provides a means of observing the communication strategies of children. Exploring how they initiate interaction through AAC and how they respond to their communication partners, their environments, and the objects they interact with can help to show the types of action they take with AAC and how they undertake these actions as well as the challenges they encounter when interacting with AAC. Examining users' interactions from a conversation analytic perspective can help researchers to take seriously these children's' situated and local communication strategies, rather than imposing expectations for how children and their communication partners should use AAC from a designer perspective.

Analysis

In this section I will analyze two clips from Family 2 to consider how issues of usability emerge in parent-child interactions with AAC technology. In particular, my analysis will borrow from ecological and network oriented perspectives of usability to consider how the usability of AAC technologies is impacted by assemblages of human and nonhuman actors and how interactions in these assemblages enact affordances for users. I examine how changes in the assemblages create different affordances—or opportunities for acting with and through technologies. The research question that guides this analysis is as follows:

- How do embodied human-technology assemblages produce affordances for users?

I identify affordances as possibilities for action brought about by interactions among participants. Since AAC is designed to facilitate children’s communication, I focus on how human-technology assemblages bring about opportunities for communicative action.

This approach to usability considers how assemblages of humans, technologies, objects, environments, and practices may be reconfigured to offer better communicative support or different affordances for users. In my analysis, I continue to draw on conversation analytic methods to explore how the child and mother of Family 2 interact with and respond to each other, the AAC technology, objects, and their environment. This methodology further offers insight into the communication practices and strategies of children who are not able to take part in typical participatory design research.

Clip 5.1. “Playdough”

The first clip I explore in this chapter, Clip 5.1: “Playdough?”, is taken from data collected with Family 2 in our fourth recording session. To review, the child in this family does not produce any verbal speech sounds as a result of the genetic condition Pitt-Hopkins syndrome. In this clip, the mother and an in-home therapist are encouraging the child to communicate what activity she

would like to do using the *toys* page on the AAC device (Figure 5.1). At the time this data was collected, the family had just switched AAC devices. In contrast to the child's previous AAC system which included buttons with photos of the child's environment and toys to represent different referents, the new device employs a different set of visual icons to symbolize referents. These icons include line drawings of stick figures and use corresponding text labels to describe the meanings the stick figures are intended to convey. Although the device software permits users to add photos to buttons, the mother explained that she had not had time to add many photos to the new device. The new device also uses a different navigational system which relies on one "home" button that allows users to navigate to the home screen from any page. The previous device included back and forward buttons, a home button, and buttons that allowed users to jump to certain core words page. Like the child's previous device, the new AAC system's buttons and pages are still organized hierarchically in that some buttons represent categories of words (food) while others represent specific words (pancakes). In programming the new device, the mother had created a set of *yes* and *no* buttons on each page to provide a way of confirming the child's intentions in selecting buttons on the AAC device. The mother introduced these buttons because she explained that it was often hard for her to tell whether her child was pressing buttons with intention or desire for communicating the specific meaning represented by the button or whether she was pressing buttons randomly. Clip 5.1 illustrates an instance of confusion the mother experienced when encouraging her child to communicate through the device.

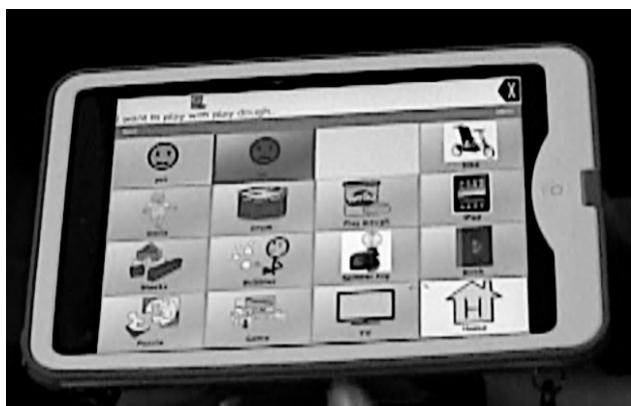


Figure 5.1. Toys page.

Caption: The image shows the home page of the child's new AAC device which is an iPad with touch screen technology. At the top of the screen there is a message bar to display the icons and corresponding text a user has selected. The user can touch the message bar to play the text aloud. Below the menu bar, the screen contains a four-by-four grid of buttons. From left to right, the first row contains buttons for "yes", "no", and "bicycle". The second row contains buttons for "dolls", "drum", "playdough", and "iPad". The next row contains buttons for "blocks", "bubbles", "spinner toy", and "books". The bottom row contains buttons for "puzzles", "games", "TV", and "home page" button.

Immediately prior to the interaction below the mother had asked the child what she wanted to do and had guided her to the toys page. The child then selected the "spinner toy" button without direct assistance or mediation. The mother, child, and therapist walked to the toy room to look for the spinner toy. When they could not find it, the mother asked the child to choose again. The child then selected the "playdough" button three times while the mother and therapist tried to explain that they didn't have any playdough left. The child also selected the "doll" and "spinner toy" buttons during this negotiation regarding what she wanted to play with. Next the therapist found the spinner toy, and the interaction in extract 5.1 followed. The clip has been divided into four extracts presented with corresponding transcripts and screen captures of specific moments of interaction. In this interaction, the therapist's contributions are marked as "THER" in the transcript.

Clip 5.1. Extract 1.

01 MOM: so we're really working on if she'll hit something but we don't know if she's hitting it
02 because she really wants it or,
03 CHILD: ((reaches toward spinner in therapist's hand))
04 MOM: here.
05 CHILD: ((turns to look at AAC in mom's hand))
06 THER: °you want that spinner huh.°
07 MOM: 「what do you want?」
08 CHILD: [((looks at AAC screen; moves hand with pointer finger extended toward screen))]
09 CHILD: ((hovers finger in front of screen (3s)))
10 CHILD: ((touches "playdough" button))



Figure 5.2. Clip 5.1, line 10.

Caption: In this image the mom and child face each other. The mom is holding the AAC device in front of her so that the screen faces the child. The child is looking at and reaching out to touch the “playdough” button with the pointer finger of her left hand.

In Extract 1, the child reached out to touch the spinner toy which her therapist is holding (line 03). Her mom intervenes in the child’s reach for the toy with her utterance “here” (line 04), which causes the child to turn toward her mom and to look at the AAC device her mom is holding (line 05). The mother then asks the child “what do you want” in an effort to encourage the child to express that she wants to play with the spinner toy through the AAC device. The child, after looking at the screen for three seconds, selects the “playdough” button. Although the spinner and dolls are toys that are in her immediate environment, she chooses the “playdough” button for the fourth time during this interaction. The child’s selection of the “playdough” button instead of the “spinner toy” button may suggest that she may not connect the “spinner toy” button to the spinner object in her environment or that she is persistent in indicating her desire to play with playdough. The AAC

device displays a variety of toy buttons, but if the toys are not available or relevant in the child's particular environment, the body-object-environment assemblage appears to afford options (playing with playdough) that cannot be realized in this context. For some children, mismatches between the child's environment and the buttons available on the AAC screen may cause usability issues to emerge as in the case of this example. The child continues to select the "playdough" button although playing with playdough is not an option. However, the child's repeated selection of the "playdough" button could also be a communicative action that demonstrates her desire to play with playdough regardless of the fact that her mother and therapist do not have any at this moment.

Clip 5.1. Extract 2.

11	AAC:	I want to	[play with playdough.]
12	MOM:			no playdough	
13	CHILD:		[((turns and walks away from AAC))]
14	CHILD:		[((looks at and reaches up with her right hand toward the toy shelf))]
15	THER:		[it's all gone.]
16	CHILD:	((continues to look at shelf with arm raised toward shelf; shakes hand))			
17	MOM:	we don't have any.			
18	THER:	it's all gone.			
19	CHILD:	((turns back to look at AAC))			
20	THER	sorry.			
21	CHILD:	((looks at AAC screen (2s)))			
22	CHILD:	((touches "playdough" button then turns and walks away from AAC))			
23	AAC:	I want to play with playdough			
24	MOM:	we don't have any.			
25	THER:	we'll have to take that one off.			
26	THER		[hehehe]
27	MOM:		[yeah, I think-]
28	THER:	I(h) think(h)-			
29	MOM:		[we'll have to-]
30	THER:		[(we don't have any)]



Figure 5.3. Clip 5.1, line 16.

Caption: In this image, the child has turned her back to her mom and the AAC device and is looking up and gesturing with her right hand toward the shelf on the wall with toys on it.

In Extract 2, the AAC device speaks the child's selection of the "playdough" button aloud, saying "I want to play with playdough" (line 11). While the device speaks, the child turns away from her mom and the AAC device to look up at the toy shelf. As she gazes at the shelf, she raises her right hand toward the shelf and makes a shaking motion (Figure 5.3). In response to the child's selection of the "playdough" button, her mom says "no playdough" (line 12) and "we don't have any" (line 17), utterances that repeat what she had previously stated when the child touched the "playdough" button in the interaction prior to the start of this clip. At her mom's second utterance (line 17), the child returns her body orientation and gaze back to the AAC device and again selects the "playdough" button and immediately moves away from the device and looks at the wall on the other side of the room from the toy shelf. At this point the therapist suggests that they remove the "playdough" button from the device. The therapist laughs (line 26) while the mom offers a reception marker "yeah" (Junker & Smith, 1998) prefacing her cut off utterance "I think-" (line 27). The reception marker works to acknowledge the therapist suggestion while transitioning to the mother's next contribution. The therapist then starts an utterance which repeats the mom's phrasing "I think-" which is also cut off. During this interaction both the mother and therapist are watching the child walk around the room, so their cut off utterances may signal distraction as they prepare to respond to the child's next action. In lines 29 and 30, the therapist and mother begin speaking at the

same time. The mother repeats phrasing from the therapist original suggestion “we’ll have to-” but cuts off her utterance to communicate with the child as the child approaches her. The therapist utterance in line 30 repeats the mom’s utterance from line 17, emphasizing the fact that there is no more playdough.

Clip 5.1. Extract 3.

- 31 MOM: what else?
32 THER: (she doesn't like-)=
33 THER: [= () ((moves hand holding spinner toy in circle))]
34 MOM: [what else do you want to do?]
35 CHILD: ((looks at AAC device as mom holds it))
36 THER: [do you want baby or spinner?]
37 THER: [((holds up a doll in one hand and the spinner in the other hand))]
38 CHILD: ((walks to THERAPIST and pushes the button to make the spinner turn))



Figure 5.4. Clip 5.1, line 38.

Caption: In this image, the therapist is holding a doll in her right hand and the spinner toy in her left hand. The spinner toy is a clear plastic cylinder with plastic balls inside and a button on top. The child is standing in front of the therapist and is reaching out and pushing the button on the spinner toy to make the balls spin.

In Extract 3, the mom tries to reorient the child back to choosing a toy on the AAC device by asking “what else?” (line 31) and “what else do you want to do?” (line 34). Like the mom’s question in line 07, the questions she poses to the child do not specify a set of toys to choose from. The child responds to her mom’s question by walking back to her mom and briefly looking at the AAC device. The therapist then asks the child “do you want baby or spinner?” (line 36) while holding a doll in her right hand and the spinner toy in her left hand in front of the child (line 37). In

the interaction prior to this clip the child selected the “spinner toy”, “playdough”, and “doll” buttons, so the therapist’s action builds on the child’s selections on the AAC by connecting two of the selections to the child’s actual toys—the spinner and a doll. Furthermore, the therapist’s question and the objects themselves constrain the set of choices for the child. Her question outlines directly two options and carries with it an expectation that the child will choose one. The child responds by walking to the therapist and pushing the button on top of the spinner to make the plastic balls spin inside the spinner. The mother’s and therapist’s questions and their embodied actions create layers of meaning within the evolving interactional assemblage. In particular, the therapist’s actions situate the device and its role in communication in relation to specific material objects and actions.

Clip 5.1. Extract 4.

39	MOM:	spin ↑ ner.	
40	THER:	k-, °then look °	
41	THER:	↑ °then look °]
42	THER:	L((takes child's hand in her hand and guides her to AAC))J	
43	THER:	↑ spinner]
44	THER:	L((guides child to touch the spinner button))J	
45	AAC:	I want to play with the spinner toy.	
46	CHILD:	↑ ((turns away from AAC and spinner toy and raises hand toward shelf))]	
47	MOM:	L ↑ okay, ↑ look.	J
48	MOM:	turn around.	
49	THER:	((sets spinner on table and starts to press the button to make it spin))	
50	TOY:	((makes a whirling and rattling sounds as balls spin inside the cylinder))	
51	CHILD:	((child turns around to look at spinner))	
52	CHILD:	((claps hands while watching spinner))	



Figure 5.5. Clip 5.1, line 44.

Caption: In this image, the therapist is holding the child's hand and guiding her to touch the "spinner toy" button on the AAC screen while the mother holds the AAC device so that the screen faces the child.

In the final Extract of Clip 5.1, the therapist uses a hand-over-hand strategy to guide the child to choose the "spinner toy" button on the AAC screen. After the child touches the spinner toy when the therapist asks, "do you want baby or spinner" (line 36), the mother says the word "spinner" (line 39). The mom's utterance frames the child's action of reaching for and pushing the spinner, speaking aloud the choice that the child has made in a similar way that the AAC device speaks aloud buttons that users touch on the screen. The therapist says "k-" showing acknowledgement of the child's choice and pivoting to her next utterance "then look" which is spoken in a soft voice (line 40). The therapist then repeats her utterance "then look" while taking the child's hand in her hand. The "then" in the therapist utterance enacts a connection between the child's embodied action of reaching for the spinner toy and the accompanying move of communicating her choice through the AAC device. As she guides the child's hand to touch the "spinner toy" button on the AAC, the therapist speaks the word aloud (line 43). In this assemblage, the therapist's questions, her embodied actions, the doll, the spinner, and the AAC device are layered together in order to create a relationship between the "spinner" button on the AAC screen and the spinner toy in the child's environment. This assemblage—not only the AAC device itself, but the whole interaction—affords an opportunity for the child to communicate a desire to play with the spinner toy. Through this interaction the mother and therapist work to socialize the child

into combining embodied gestures and symbolic modes of communication through the AAC system in the activity of making choices among her toys.

In this way, the usability of the AAC device for the activity of choosing toys requires more than the child's selection of a toy button on the AAC. The device's usability results from layered interactions of an assemblage of actors, actions, and objects including the child, the mom, the therapist, the AAC device, toys, and the environment. As the interaction in Clip 5.1 unfolds, the layers of actions enact social and material constraints on the activity of choosing a toy—ultimately creating a more supported and structure interactional framework that affords the possibility for the child to connect a specific toy to a button that represents the toy on the AAC device. The mother, child, and therapist work to reconfigure their interactional assemblage by reconfiguring their questions, gestures, and the objects of their environment to negotiate the possible toys the child can choose on the AAC device.

Although the assemblage affords this connection, the final extract in this interaction reveals that the child may still be trying to communicate something different or additional than what the therapist guides her to express using the “spinner” button. After being guided to press this button, the child turns around to look at the toy shelf and raises her hand toward the shelf. She does not, upon selecting the “spinner” button, proceed to play with the toy immediately, but tries to draw her mom and the therapist's attention back to the toy shelf that she has pointed to several times during their prior interaction.

This disjunction between the child's embodied actions and her guided use of the AAC highlight the ways that assemblages offer possibilities for interaction, but may end up prioritizing some types of communication, objects, or actions over others in the collaborative process of meaning making. The child's embodied actions which don't neatly align with the other layers of the assemblage must also be attended to in order to understand how technologies may be usable not

only for the parent's and therapist's expectations of AAC communication, but also for considering how the assemblage may more substantially include the child's creative combination of embodied actions in conjunction with AAC use. In fact, in the interaction that ensues after the end of Clip 5.1, the child plays with the spinner toy for a while but also continues to look up at and gesture with her hand toward the toy shelf. Observing the child's gestures and gaze, the therapist and mother discuss whether the child is looking for her block—toys that the child plays with often. The mother takes the child's hand and guides her to touch the "I want" button, followed by the "toys page" button on the AAC device. When the AAC device navigates to the toys page, the mother directs the child's hand toward the "blocks" button and then releases her hand. The child then presses the "blocks" button without hand-over-hand guidance. As the AAC device speaks out the phrase "let's play with blocks" the child waves her arms up and down and produces vocal sounds while looking at the shelf. The therapist takes the box of blocks down from the shelf and the child smiles and bounces her arms up and down while looking at the box (Figure 5.6).



Figure 5.6. The child reacts to seeing the box of blocks.

Caption: In this image, the child is smiling and looking at the box of blocks which the therapist is holding.

The child's embodied actions when the therapist gets the box of blocks off the shelf suggest that her gaze and gestures toward the shelf during the prior interaction indicated her desire to play with these toys. Although the "blocks" button was available on the toys page during the entire interaction, the graphic of blocks on this button do not closely resemble the block toys in the child's

environment. Since the device is new, she might not yet associate this button with her actual toy blocks.

Clip 5.2. “The Block Game”.

Clip 5.2 “The Block Game” is taken from the same recording session with Family 2 as Clip 5.1. Prior to this Clip 5.2, the mother and child were taking turns shaking a toy block that makes a rattling sound. The shaking block activity is a game that the child’s therapist plays with her during their therapy sessions and it an activity the child seems to enjoy a lot. In Clip 5.2, the mother asks the child if she likes playing the block game and encouraging the child to use the “yes” or “no” button on the AAC device to answer this question. The screen that the mother and child use in this clip is the “my words” page which is presented and described below in figure 5.7. Each button on the “my words” page presents a drawing that symbolizes the meanings each word represents. For example, the “yes” button is illustrated with a smiley face while the “no” button is illustrated by a sad face.



Figure 5.7. My words page.

Caption: This image shows a screen shot of the AAC screen, the “my words” page, used in Clip 5.2. The top row of the screen from left to right displays the “yes”, “no”, “my turn”, and “your turn” buttons. The middle top row displays the “please”, “thank you”, and “you’re welcome” buttons. The middle bottom row displays the “help”, “turn on”, and “stop” buttons. The bottom row displays the “love”, “like”, “don’t like”, and “home” buttons.

In Clip 5.2, the mother is seated on a couch and is holding the AAC device so that its screen faces the child who is standing in front of her mother. The mom is using her left hand to point to buttons on the AAC screen.

Clip 5.2. Extract 1.

01 MOM: hey, do you like playing the block game?
 02 MOM: [yes, or no.]
 03 [((points to “yes” and “no” buttons as she says the words))]
 04 MOM: ((removes finger from screen))



Figure 5.8. Clip 5.2, line 02.

Caption: In this image, the mother and child are facing each other. The mother is seated on a couch and is holding the AAC device in her right hand. The mother is holding a toy block with the index and thumb of her left hand and is using her pinky finger to point to the “yes” button on the AAC device. The child is looking at the screen.

In Extract 1, the mom asks the child “do you like playing the block game?” (line 01). After she asks the question, she points to the “yes” and “no” buttons while saying the words represented by each button (Figure 5.8). She then removes her hand from the screen to allow the child to select a button (line 04).

Clip 5.2. Extract 2.

05 CHILD: ((moves finger toward the AAC screen))
 06 ((pulls her hand away and looks at AAC screen))
 07 ((leans her face closer to the AAC device and touches “you’re welcome” button))
 08 AAC: [you’re welcome]
 09 CHILD: [((looks at mom))]
 10 CHILD: ((briefly brings her hands together in front of her body))
 11 MOM: ↑YE:S or no::↓.
 12 ((moves finger over “yes” and “no” buttons))

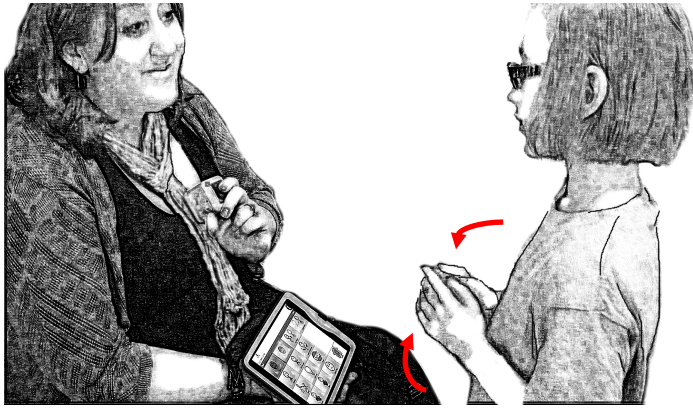


Figure 5.9. Clip 5.2, line 10.

Caption: In this image, the child has just pressed the “you’re welcome” button. She is looking at her mom and is bringing her hands together in front of her body.

Although the child watches while her mom points to the “yes” and “no” buttons (lines 03 & 04), she does not conform her response to her mother’s yes-no question or her mother’s pointing gestures. Before making her selection, she hesitates, moving her hand toward the screen (line 05), but then lifting it up away from the screen (line 06). She then leans forward and touches the “you’re welcome” button (line 07). Her hesitation and leaning toward the screen as she selects a button indicate that she is attending to the choices on the AAC screen, rather than choosing a button without considering what choices are available. As previously mentioned, the mother purposely programmed a “yes” and “no” button on each page of the device so that she could encourage the child to confirm her choice of buttons. For example, if the child selected the outside button, the mother could ask “Do you want to go outside, yes or no?”. However, as the child’s response in Extract 2 suggests, she may not be familiar with the communicative activity of answering yes-no questions with the AAC device. Rather than choosing the “yes” or “no” buttons, she touches the “you’re welcome” button. This button displays a stick figure with a smiling face extending its arms and hands out on either side of its body. It appears to have arms and pointer fingers extending upward and the text below the stick figure reads “you’re welcome”. To the outside of each hand is a curved line with an arrow pointing up indicating an upward movement of the figure’s hands (see

figure 5.2.4). The relationships between the stick figure and its gesture, and the referent it is intended to represent (you're welcome) although the relationship between the graphic and the meaning is not clear.



Figure 5.10. "You're welcome" button.

Caption: Figure 5.10 shows a screen capture of the "You're welcome" button described above.

It is possible that the child might interpret this button as representing an activity related to shaking the blocks due to the motion suggested by the arrows around the stick figure's hands, but it is impossible to tell whether this is the reason the child selects this button. Although the child selected this button multiple times during the Clip 5.2, she also selected other buttons like "turn on". Regardless of the child's reason for choosing this button, her gaze and gesture after her selection of the button indicate that she is expecting her mom to respond to her selection in a particular way. After touching the "you're welcome" button she looks at her mom and taps her hands together in front of her body. Her gaze at her mom and her clapping gesture suggest that she is waiting for her mom to do something—most likely to shake the block since this is the activity they had been doing before the mother asked the yes/no question. The mother responds to the child's selection of "you're welcome" by repeating "yes or no", slowing down and emphasizing her pronunciation of these words and using a rising and falling intonation pattern. While saying "yes or no", the mother moves her finger quickly back and forth above the corresponding buttons on the AAC screen.

Clip 5.2. Extract 3.

- 13 MOM: do you like the blocks?
14 MOM: [<ye:s (.) or no.>]
15 MOM: | ((points to *yes* and *no* buttons as she says the words)) |
16 CHILD: [((holds her finger near the *yes* and *no* buttons as mom points))]
17 MOM: ((removes hand from the screen))
18 CHILD: ((moves her finger away from the screen and then presses the “turn on” button))



Figure 5.11. Clip 5.2, lines 16 & 18.

Caption: Figure 5.11 shows two images collected from the video data in a chronological sequence from left to right. In the image on the left, the mother is pointing to the “no” button on the AAC screen and the child is following the mother’s finger with her own finger. In the image to the right, which occurred shortly after the first image, the mother has removed her finger from the screen and the child has pulled her hand back from the “no” button. She is looking at the screen with her pointer finger extended and her hand raised over the screen.

In Extract 3, after her initial emphatic response (Extract 2, line 11) to the child’s selection of “you’re welcome”, the mother repeats her question “do you like the blocks?” (line 13). The mother’s repetition of her question works to remind the child of the context of this communicative activity the mom has initiated and the expectation for the child to choose the “yes” or the “no” button. Next the mother repeats slowly the possible answers to her question, “yes or no”, while pointing to each button as she speaks the words (lines 14 & 15). The mother’s slowed pace creates an emphasis on naming and pointing to the “yes” and “no” buttons and provides more time for the child to attend to these two buttons—matching the buttons to the words they represent. While the mother points slowly to the buttons, the child follows the mother’s pointing gesture with her finger (Figure 5.11) but does not touch a button. After pointing to and naming the “yes” and “no” buttons, the

mother removes her hand from the screen, holding it against her body (Figure 5.11). The mother's repetition emphasizes her expectation for the child to choose yes or no. Although the mother's pointing gesture works to narrow the child's choices to "yes" or "no", when she removes her hand from the screen, this opens the possibility for the child to choose any of the buttons on this screen.

Clip 5.2. Extract 4.

19 AAC: [turn on]
 20 CHILD: [((looks at mom))]
 21 CHILD: ((moves her arms up and down at the sides of her body))
 22 MOM: [no,]
 23 [((looks at child and shakes head))]
 24 MOM: [yes or no.]
 25 [((points to "yes" and "no" buttons as she says the words))]
 26 MOM: ((removes hand from AAC screen))
 27 CHILD: [((moves hand toward the screen))]
 28 MOM: [do you like blocks?]



Figure 5.12. Clip 5.2, line 21.

Caption: In this image, the child has just pressed the "turn on" button. She is extending her hands out to the side of her body and shaking them while looking at her mom.

In Extract 4, the child's response to her mom's prompting her to choose one of the "yes" or "no" buttons follows a similar pattern to her previous response. She chooses another non-conforming phrase, "turn on", which does not match the yes/no form of the mom's question. The child follows her response by looking at her mom and extending her arms out to the sides of her body and shaking her hands in the air briefly. This time her mom responds more directly to her choice of a non-type-conforming response by saying "no" (line 22), looking at the child, and shaking

her head. The mother then repeats the possible responses to her question, “yes or no”, while pointing to the respective buttons. She then removes her hand from the screen again. The mother repeats her question “do you like blocks” as the child moves her hand toward the AAC screen (line 28). The mother’s direct negative feedback to the child’s response works to constrain and make apparent the mother’s expectations for the child’s response and again emphasizes the act of choosing the “yes” or “no” button.

Clip 5.2. Extract 5.

- 29 CHILD: ((leans over AAC screen))
 30 CHILD: ((hovers finger over the middle of the screen))
 31 (2s)
 32 CHILD: ((moves finger and touches the “yes” button))
 33 AAC yes
 34 CHILD: ((looks at mom as she extends her arms out and shakes her hands))
 35 MOM: yes. Okay.=
 36 MOM: [=Is it your turn?]
 37 [((points to “my turn” button on AAC))]
 38 CHILD: ((moves hand toward AAC))
 39 MOM: ((removes finger from AAC))
 40 MOM: say ↑my turn.
 41 CHILD: ((touches “my turn” button))



Figure 5.13. Clip 5.2, lines 30 & 31.

Figure 5.13. Extract 5, lines 30-31.

Caption: This figure shows two images collected from the video data in a chronological sequence from left to right. In the left image, the child is reaching toward the AAC screen with her finger extended. She is hovering her finger above the central region of the screen where the “you’re welcome” button is located. In the image on the right, which occurs directly after the left image, the child has moved her finger to the “yes” button in the top left corner of the AAC screen. In both images the mom has removed her hand from the screen and is watching the child’s actions.

In the Extract 5, the child leans over the AAC screen and hovers her finger over the middle region of the screen where the “you’re welcome” button is located. She hovers her finger over the screen for two seconds and then moves her finger to the left-hand corner of the screen to touch the “yes” button. After she makes her selection of “yes” she extends her arms out at her sides and shakes her hands briefly. Her hand shaking gestures mimics the activity of shaking the blocks and suggests that she may use her selections of buttons on the AAC as a means of requesting to play the shake blocks activity again. After she has selected the “yes” button, her mom confirms her response by repeating it “yes” (line 34). The mother then says “okay”, a receipt marker which works to show approval of the child’s selection of “yes” while also closing the activity of answering the yes/no question and transitioning to the next activity (Beach, 1993). She then asks the child “is it your turn?” while pointing to the “my turn” button on the AAC screen. The mother’s utterance returns the interaction to the activity of “shaking the blocks” indicating that she has understood the child’s embodied actions throughout this clip as efforts to reinitiate this activity with her selections of “you’re welcome” and “turn on” instead of “yes” or “no”. Since the mother is holding the block and was the last one to shake it, her question encourages the child to choose a button that represents the communicative action of managing or sharing turns. As the child moves her hand toward the screen, the mother removes her hand and says “say my turn” raising the pitch of her voice in “my turn”. The child then touches the “my turn” button without hesitation. The child has used the “my turn” and “your turn” buttons on this page in the shake blocks activity and in other interactions in the data. She may be familiar with using these buttons to engage in social activities like turn management. In a sense, she is more socialized into the use of these buttons whereas the “yes” and “no” buttons are new components of her current AAC device.

As mentioned previously, in customizing the child’s new AAC device, the mother included a set of “yes” and “no” buttons in the top left corner of each page in the AAC system. She expressed

hope that the “yes”/“no” buttons would provide a means of verifying the child’s choice of a button. For example, during recording session four, prior to the interactions in Clips 5.1 and 5.2, the child had pressed the “playdough” button three times, the “spinner toy” button twice, and the “doll” button once. After the therapist found the spinner toy and brought it to the child, the mother asked the child “is that what you want? Yes or no”, while holding the device in front of the child. The child then selected the “playdough” button and the “doll” button and then pushed the AAC device away and walked over to the therapist who was holding the spinner toy. This interaction illustrates the difficulty the mother and child sometimes encounter when trying to establish intersubjectivity regarding the communicative function of the device, its buttons, and its relationship to the activity at hand. The child sometimes reacts to the device as a task that she has to do before she can play with a toy, such as the spinner toy. In instances like this, she may try pressing multiple buttons without looking closely at the device, or without looking at it at all.

The mother’s inclusion of the “yes”/“no” button attempts to address a usability concern that emerges when the AAC device is integrated into communication. In other word, confusion regarding children’s intentional selection of buttons is not something that is likely to be observed or emerge in usability labs because the challenge emerges when the device is integrated into a social setting and in situated activities such as choosing a toy to play with. The inclusion of the “yes”/“no” button constitutes the mother’s tinkering with the AAC system, and it allows her to initiate a communicative activity based on confirming or verifying selections the child has made with the AAC. The mother’s tinkering is not limited to the design and organization of buttons on the AAC. She also manipulates her communication strategies when interacting with the device. For example, after the child did not choose the “yes” or “no” button when prompted, the mother slowed down her pace of speech and pointed to each button again while speaking the words represented by these buttons (Clip 5.2, Extract 3, line 14). Likewise, the child’s gaze and gestures show her attending to

her mother's response. At one point, she follows her mother's gesture with her finger pointing to the "yes" and "no" buttons as her mother points to these buttons (Clip 5.2, Extract 3, lines 16 & 18). The child also experiments with choosing different buttons like "you're welcome" and "turn on" rather than "yes" or "no". She combines her selections on the AAC device with gestures to create communicative assemblages of AAC buttons and gestures.

Discussion

The mother's and child's communication strategies constitute parts of the interactional assemblage or "body-object-environment-assemblages" as Fountain (2014) describes them. The participant's bodily orientation, their gestures, gaze, and utterances combine with the objects like the AAC device and their environment to create an interactional assemblage. Through interactions among participants and components of the assemblage, certain possibilities for action emerge. For example, in Clip 5.2, the presence of the "yes"/"no" buttons on the AAC screen when it is used in combination with the mother's question ("do you like the block game?") and in the context of the block game affords the possibility for the child to participate in the activity of evaluating the block game. The other buttons on my words page offer the child different opportunities for responding to her mother's question. Although the child's selection of "you're welcome" and "turn on" do not conform to type of response the mother's question projects, these responses nevertheless signal that the child is trying to communicate something. Her initial hesitation to press the "yes" or "no" buttons even after her mother's questions and directive gestures suggest that her selection of other buttons may be a rejection of sorts of the yes/no activity. The AAC device and the child's communicative strategies afford her the possibility of avoiding answering her mother's question. The assemblage affords the possibility for the child to communicate in ways that are different from what is an expected response to the mother's question. The child's reluctance to select the yes/no buttons when presented with the other possible buttons on the AAC screen attests to the

importance of collective and negotiated models of meaning making. The affordances of assemblages make available different possibilities for negotiating meaning. The child's response is hearable as reluctance to respond with the "yes"/"no" buttons precisely because those buttons exist and because the mother's question makes them relevant as preferred answers. The child's insistence on choosing other buttons in combination with her gestures and gaze suggest that she is trying to reinitiate the activity of shaking the blocks instead of participating in responding to the yes/no question. I am not arguing that the mother's strategy to create a yes/no button negatively limits the child's opportunities; gaining an understanding of this type of communicative activity can be very beneficial for the child. My argument, however, is that the child's ability to avoid participating in this activity is also an affordance that has value in this interaction. In particular, it allows the child to show her interest in continuing to play the block game and it reveals her tinkering with different buttons to try to negotiate this goal with her mom. In a similar way, the child's repeated selection of the "playdough" button in Clip 5.1 does not on the surface seem like a relevant answer to the mom's question of what the child wants to do. However, in considering her selection of the "playdough" button in relation to the interactional assemblage, her selection takes on new possible meaning. The child repeatedly presses the button and then looks up at the toy shelf while extending her arm toward the shelf and shaking her hand. The unexpected answer requires the mom, therapist, and child to further negotiate the activity at hand, to tinker with their strategies, questions, responses and selections on the AAC device in order to produce additional possible meanings and opportunities for action. Ultimately, the mother and therapist surmise that the child's embodied actions may signal her desire to play the block game. The referential meaning signaled by the "playdough" button introduces confusion into the interaction. The mother and therapist repeatedly tell the child that there is no playdough, but the child continues to press this button. It is only within the context of

interrelations and negotiation within the human-technology assemblage that the child's selection of the playdough button begins to take on new meanings and to create new opportunities for action.

What these interactions illustrate is that technological features do not often have a simple relationship to affordances. Affordances may not always correspond directly with the intentions of a designer or technical communicator. The "playdough" button in a particular context may afford the child the possibility of communicating that she wants to play with playdough. However, in the context examined in Clip 5.1., the "playdough" button in combination with the child's embodied action creates a necessity for the mother and therapist to continue to search for what the child is trying to communicate. This evolving assemblage offers opportunities for further negotiation which lead the mother and therapist to suggest the block game. The child's smile and gestures when she sees the block game indicate that this is what she has been trying to express. In light of this analysis, I argue that affordances emerge as possibilities for action within human-technology assemblages. Affordances make available different possibilities for acting and reacting and, in turn, when acted upon, become part of the process of negotiation and meaning making.

Social Affordances

Sun and Hart-Davidson (2014) argue that in addition to attending the *instrumental affordances* made relevant by technologies, designers should also consider the ways that technologies *instrumental affordances* help enact social affordances. Sun and Hart-Davidson (2014) explain that "issues of agency, identity, dominance, ideology, and power often are associated with social affordances but occasioned and encountered in concrete terms in instrumental affordances" (p. 3538). For these scholars, the immediate instrumental possibilities for action that emerge in human-technology relationships are situated in social and cultural milieu that impact usability. Social affordances regard how human-technology relationships bring about and enact opportunities for certain users. These affordances relate to the ways power distribution is enacted in human-technology relations. With

respect to AAC technologies and the interactions presented above, in a general sense, AAC technologies provide an additional mode of communication for children with complex communication needs. However, it's important to note that communication through AAC, just like any form of conversation communication is negotiated and collaboratively constructed. The voice children acquire through AAC is shaped by the design of the device, the buttons that have been programmed into its system, and the practices and communication strategies that surround its use. Interaction through AAC technology is interdependent, collaborative, and negotiated like all communication. Attending to the ways that communication through AAC is negotiated can help to illuminate how communicative assemblages may be remade to offer different social affordances for children and their communication partners.

Implications for Usability

Distributed, posthuman approaches to usability posit that usability emerges from complex human-technology assemblages. One important feature that runs across these approaches is attention to sources of uncertainty and ambiguity in human-technology relationships (Rivers & McNely, 2014; Rivers & Söderlund, 2015). For McNely and Rivers (2014) this means examining how *missing masses* impact the usability of technologies and texts and attending to the interrelations and interagency that emerges from interaction of these missing masses. Rivers and Söderlund (2015) argue for using the agency of objects productively by designing for uncertainties. My approach to usability draws on uncertainty or ambiguity, particularly in the form of communication breakdowns, to examine how communicative assemblages afford unexpected uses of the AAC technology and how these uses may inform understandings of the usability. In the clips discussed above, the child's choices may on first impression appear random and irrelevant in relation to her mother's questions and prompts. Her choices do not conform to types of responses projected by the mom's questions and uncertainty emerges due to misalignments between the questions and the child's responses.

Uncertainty reveals the *seams* of their human-technology assemblage and provides agentive spaces where misalignments cause the participants to renegotiate their relationships. The participants deal with this uncertainty by reconfiguring their communicative assemblages, modifying and reworking their responses to each other, the AAC device, and their environment. This negotiation can be productive and can lead to new configurations of communicative assemblages that in turn lead to different affordances for acting. This ambiguity at the seams of interaction is a generative part of the interaction. It necessitates negotiation that accounts for the child's selections as well as the other aspects of the assemblage. This approach to usability does not frame the child's or mother's strategies as errors or mistakes as might happen if we examine usability in isolation. Likewise, it is not focused solely on trying to *solve* the problem of ambiguity through purely technical solutions. Rather, a posthuman usability allows researchers to take seriously the child's communicative strategies and examine them in relation to the evolving communicative assemblage.

Implications for AAC Design & Technical Communication

One of the challenges in designing AAC devices for children with CCNs who are not yet literate is incorporating user needs, values, and perspectives into the AAC system. This is especially the case for children who cannot for various reasons participate in interviews or suggest design ideas due to mismatches between participatory design methods and children's cognitive and bodily realities. Observing users' interactions with AAC devices offers a way to consider how they orient to and use AAC creatively in communication in the context of breakdowns or ambiguities. It illustrates ways in which expectations for how AAC devices should or will be used run up against participants novel and creative uses of the technologies. This suggest that designers, technical communicators, communication partners and others who support the use of AAC by children with CNNs may attend to these users' particular strategies in order to better understand the ways they interact with and through AAC and to consider how the human-technology assemblage may be reworked in

certain ways to better facilitate negotiation and to better address children's diverse communicative strategies. For example, although AAC systems rely heavily on graphic systems of representation to convey meaning, it is important to realize that the relationship between the graphic and the children's environment is always being negotiated and worked in interaction. This observation may change expectations for how children should use AAC devices, allowing for inclusion and acknowledgement of children's novel and creative strategies.

Conclusion

Taking a posthuman approach the usability of AAC technology helps to illustrate the ways that usability issues emerge not only from technical features of the devices, but also from interactions within the human-technology assemblages in which AAC technologies are integrated. Interactions within these assemblages create affordances for users in the form of possible actions that users can take in relation to the successive layers of prior interaction. Attending to the ways that users negotiate relations within complex human-technology assemblages opens up new avenues for usability work that accounts for embodied interactions of multi-parties, not just for single users and technologies. Most importantly, this approach to usability illustrates that successful use does not take the same form for all users. As can be observed in this chapter, although the child participant's interactions with and through AAC did not always align with her communication partners' expectations, her strategies had particular communicative value for her specific context and environment. This chapter demonstrates that expanding usability to interactions of human-technologies assemblages makes available different views of user's strategies—highlighting the ways that users participate in complex relations with technologies and the types of affordances that emerge from these relations. As technical communicators, this approach to usability can help us to be better attuned to diverse users' own strategies of interaction in their local contexts so that we may be more inclusive in acknowledging different forms of use. Additionally, attending to interactions

may help us to facilitate users' negotiations within human-technology assemblages that bring about possibilities for agency.

Chapter 6 : Conclusion

Overview

This chapter serves to summarize the main findings of my project and to consider the implications of these findings for notions of agency, interdependence, and disability in human-technology relationships. First, I will briefly summarize the findings of my research and my main arguments in relation to the research questions posed in my methodology chapter. Next, I discuss this project's contributions to TPC scholarship, and I conclude by exploring avenues for extending the research presented here.

Summary of Findings

R1: How can we describe the families' interactions via AAC technologies?

First, one of the primary aims of this project has been to examine how children and their parents interact with and through AAC devices and to identify challenges families encounter when learning to use AAC devices. Specifically, I wanted to understand how human and nonhuman micro-level elements shape the unfolding interaction and contribute to affording or constraining different types of actions. I have argued throughout this manuscript that users' embodied interactions with other humans, technologies, and their local environments constitute a rich source of data for understanding how usability is distributed within human-technology assemblages and emerges from interactions within these assemblages. In examining users' embodied interactions with technologies, I pay particularly close attention to the ways that both human and nonhuman actors impact users' interaction through AAC technologies. As such, my research in Chapter 4 focuses on observing the ways that participants' embodied actions including their gaze, gestures, body position, facial expressions, and utterances along with elements of the AAC technology and the environment contributed to the participants' unfolding intersubjective understanding of their interaction at hand.

The Role of humans and nonhumans in interactions with AAC

In describing families' micro-level interactions with AAC technologies, I first focus on my findings regarding the role of nonhumans in interaction. My observations and analysis of children and parents interacting with and through AAC technologies suggest that objects play complex roles in the families' communication. Objects like toys and AAC technologies are simultaneously tools that are used by humans to negotiate their sociomaterial world as well as active contributors to the interaction. Nonhuman actors introduce information that human participants may attend to and sometimes must account for. As Cooren (2015) argues, these objects may cause human participants "to speak", to address their presence and to account for their impacts on communication. In this way, objects are not merely extensions of human intention. As Rivers and Söderlund (2015) argue, objects introduce uncertainties into human interaction and attending to the uncertainties helps to illuminate creative and unexpected uses and impacts of technologies. Thus, human participants must grapple with these uncertainties, negotiating the role and status of objects in their interactions. Importantly, these negotiations are embodied and bring together both social and material aspects of interaction. In other words, the status of objects in interaction is not decided by human discourse alone, but also by humans' embodied interactions with the material qualities of object.

One particular mode of uncertainty in AAC communication arises from the relationship between the buttons displayed by the AAC screen and their relationship to objects, concepts, and activities in users' local environments. AAC screen displays with multiple buttons allow for the simultaneous emergence of affordances and constraints in interaction. AAC buttons make available certain actions that the users can take relative to the ongoing interaction while constraining other possibilities. This situation can be observed in Chapter 4, Clip 4.1 of Family 2. In this clip, the mother asks the child to communicate what she wants to do through the AAC device. The buttons on the AAC screen, then, represent possible selections that the child can make in responding to her

mother's question, but the device always displays a finite set of buttons and to access certain buttons the child must navigate through different layers of representation within the AAC system. To reach the "drum" button, she must select the "toys page" button from the home screen and then select the "drum" button from the toys page. In contrast, to select the "patty cake" button, she must select the "I would like" button from the home page; next, she must select the "games" button on the "I would like" page; she must then select the "songs" button from the "games" page; and finally, she can select the "patty cake" button from the "songs" page. There are, of course, other ways to navigate to the "patty cake" button, but all of them require multiple navigational layers. All these factors constrain the ways that the child can respond to the mother's question. Although the organization of buttons on these pages can be customized by users (in this case the child's mother), the system only ever displays finite sets of buttons, which cannot capture all the meanings that a speaker may wish to communicate. In this way, the AAC system's organization introduces constraints into users' communication—making certain buttons readily available while concealing others under navigational layers. The constraints of these buttons shape what users can communicate and how they communicate, but even these constraints are negotiated through the interlocutors' communicative assemblage. In Clip 4.1, the child chooses the "drum" button on the AAC device several times; however, her embodied action (clapping her hands) suggest that she is trying to initiate a game of patty cake with her mom rather than asking to play with a drum. What the "drum" button affords in this particular interaction is negotiated by the participants' embodied actions. Her mother and friend respond to the child's use of this button by looking for and bringing a toy drum to the child—which the child seems to reject when she walks away from her communication partners and the drum. In this clip, the meaning of drum that the child enacts must be negotiated in relation to her communication partners' understandings and to her local environment. The button that the child seems to be searching for—the "patty cake" button—is not

immediately available on the pages (the toys page, therapy page, and programs page) that the child navigates through on the device during this clip.

The buttons are designed to convey conventional meanings so that the “drum” button represents a physical toy drum in the child’s environment, but even so, there is always a gap between a sign and its signified because the sign always presents a level of abstraction and distance from the material referents or social concepts it is designed to represent. For example, the child’s AAC device shows a graphic of a drum, but the child has several different toy drums in her house—so there is always a question regarding which drum this button signifies. This gap between the signifier and the signified introduces uncertainty in meaning and action, which must be negotiated by the speakers. Speakers collaboratively enact meanings through their interactions with the technology in their local environment. For example, in Chapter 4, Clip 4.2 of Family 1, the child and mother negotiate the relationship of the toy scissors to the “cut it” button on the AAC device. They must further manage the role of this button in relation to the competing activities that the mother and child are trying to accomplish in this interaction. The child’s goal in this interaction is to gain a turn using the scissors as evidenced by her selection of the “my turn” button whereas her mother’s goal is for the child to use the AAC device to identify the activity the child can do with the scissors, namely “cut” something. They must further negotiate the linguistic fit of the button’s vocalized expression “cut it” in relation to the mother’s evolving questions to the child, first “what do you want to do?” and then “what is this?” referring to the scissors. Consequently, by virtue of AAC systems’ use in communication, which is constituted by a collective process of negotiation, these systems do not afford direct relationships between buttons, objects, and activities. These relationships must be enacted and managed through interaction so that the social and material uses of the buttons are situated in and shaped by users’ local environments and interactional needs. In sum, my findings suggest that although AAC buttons may be designed to convey conventional meanings in

interaction, it is important to attend to the uncertainties that they introduce and to examine how interlocutors negotiate relationships between specific buttons, their environment, and their communicative activity.

In addition to considering how AAC systems shape participants' communication, another prominent finding of my research considers the role that objects such as toys and concepts such as colors or shapes play in AAC communication. Since the data I collected occurred primarily during children's play times, toys and other play objects and concepts are prominent features in the interactions I observed. I found that parents and children often used toys to constrain and verify communication through the AAC system. In other words, when toys were present in the children's interaction space, they were often used to negotiate the relationship between the buttons displayed by the AAC system and the activities and objects that could be associated with the buttons in the child's environment. In this way, they constrained the possible meanings and affordances that buttons enact and bind these meanings to specific objects in the child's environment and to activities that users can perform with these objects. Of course, the role of the objects themselves in these interactions is also open to negotiation and reconfiguration. For example, in one interaction in my data with Family 1, the mother and child were playing tea party. At the beginning of the activity, the mother asked the child what she needed for the tea party and the child responded by selecting the "pour" button on the AAC device. Later in the interaction, the mother asked the child to use a small tea pot to pretend to pour tea in the mother's tea cup. Instead of directly pretending to pour her mother some tea, the child found another, larger pot and pretended to pour its make-believe contents into the smaller tea pot (see Figure 6.1 below).



Figure 6.1. Tea pot clip.

Caption: The child pretends to pour the large tea pot's contents into a smaller tea pot.

After she had done this, she pretended to pour her mother some tea using the smaller tea pot. The child's actions enact a meaning of pour and the action of pretending to pour that is not only tied to the tea pot object, but also connected to the idea of the tea pot being full of something to pour. This interaction illustrates that the status and use of objects and their relationships with buttons on the AAC device are collaboratively enacted through interaction. The tea pot's use as an instrument for pouring is contingent upon the participants' developing enactment of its social and material affordances in situated activities. Thus, the relationship between the "pour" button on the AAC device and the use of the tea pot during this play activity is locally enacted and collaboratively negotiated. The meaning of the "pour" button on the AAC device is contingent upon the users' developing intersubjective understandings of the activity at hand as well as of the material objects in their local environment, such as tea pots and tea cups.

Ultimately, I argue that the process of communicating with and through AAC technologies is posthuman and interdependent. It is posthuman in that meanings and actions emerge from assemblages of human and nonhuman actors. Both the social and material qualities of these actors impact the interaction of the communicative assemblages so that agency is distributed through the assemblage, and importantly, emergent in the interactions of the assemblage. Attending to the status and contributions of nonhumans such as objects like scissors, graphics on the AAC screen, and

concepts like colors, shows how communication among humans is shaped by nonhumans in dynamic and evolving ways. Although humans and nonhumans interact in different ways, nonhuman potentials extend beyond human intention and often offer unexpected or surprising information or material realities that humans must account for and respond to in interaction. This process of accounting for and responding to other actors in human-technology assemblages is interdependent and collectively enacted.

Negotiating Breakdowns and Boundaries

In describing children's and parents' interaction through and with AAC devices, I attend to the ways that breakdowns in communication and boundaries between actors arise and how human participants navigated these breakdowns and boundaries. One important finding that emerged from my observations of how participants negotiate breakdowns and boundaries is that breakdowns often result from assemblages of actors rather than from a single actors or element in human-technology relations. In this sense, breakdowns constitute spaces of disjunction or misalignment between members of an assemblage. This view of breakdowns aligns with approaches that figure communication as collaborative and collectively shaped. For example, in Clip 4.1 of Chapter 4, a breakdown in the child and mother's communication emerges when the mother encourages the child to use the AAC device to communicate what she wants to do. As previously discussed, in this interaction, the child chooses the "drum" button several times, but the conventional meaning of this button does not align with her embodied actions including her clapping gesture and her gaze and body position directed toward her mother. The mother responds to the child's interaction by asking her to try again to communicate through the AAC. The child then goes back to the AAC and touches different navigational buttons (therapy and programs) searching for a button that will communicate what she wants to say. The breakdown is not directly a problem of the AAC, the child, or the mother, but rather, a problem of their cumulative interactions. The particular organization of

the AAC and the placement of the button the child is searching for are not immediately accessible to her on any of the pages that she navigates to; in addition, the mother's communication strategies do not provide any guidance or structure to enable the child to find the button she seeks. The mother and child deal with this breakdown in their intersubjectivity by manipulating or reconfiguring the different parts of their assemblage and observing how these changes impact each other's interactions, looking for new opportunities for communication to emerge from their reconfigurations. Consequently, I argue that breakdowns can be productive moments of change in assemblages. Observing how users negotiate breakdowns allows researchers and to consider how users tinker with their communication assemblages to bring about different possibilities for future action. As I discussed in the introduction to this project, breakdowns in communication reveal fissures in human-technology assemblages. Users manage such fissures through changing and reworking their strategies and their environment. This process is agential in that it opens up new possibilities for acting with and through AAC.

Another important outcome of this project regards the users' strategies for negotiating breakdowns and boundaries in interactions. I have argued throughout this project that observing how children with CCNs interact with and through AAC technologies in their local environments of use can help researchers to take seriously children's own communication practices and orientations toward technologies, objects, communication partners, and environments. Observing children's strategies for interacting with AAC has important implications for notions of accurate AAC use. Children's *accurate* use of AAC was a concern brought up by parents in interviews and interaction data. Although parents did not define accuracy explicitly, its contextual meaning seems to relate to the extent to which children's selections on the AAC align with their interlocutors' expectations regarding the buttons' conventional meanings and the fit of these meanings with the context. This concern suggests that accuracy in the use of a device is an aspect of children's practices with AAC

and that this practice of using the device accurately extends beyond contextual sensitivities of particular communicative events. It assumes that a child's accuracy can be evaluated independently of the context in which the communication took place and of the child's embodied actions in conjunction with their AAC selections. In contrast to this assumption, my findings suggest that children may use AAC technology in complex and creative ways by combining their choice of buttons with embodied actions such as gaze and gesture. In doing so, they may enact meanings through AAC buttons that extend beyond the conventional referential meanings that one might expect AAC buttons to communicate. For example, in Chapter 4, Clip 4.1, the child's use of the AAC showed a distinction between buttons like therapy and toys pages that allow users to navigate to different pages and the content buttons collected on the toys page. When the child selected content buttons like "drum", she acted on these buttons by gazing at her mom, turning and moving her body toward her mom, and clapping her hands. While the "drum" button may appear to be a random choice for the child and may appear to be misaligned with her embodied actions, her treatment of this button is remarkably different from her treatment of the navigational buttons. This difference suggests that she is using the "drum" button in a specific way, combining it with embodied actions to enact a new meaning through the button. Moreover, when her mother does not respond to this communicative assemblage by engaging with the child's out stretched hands, the child tries different ways to communicate what she wants—but she still attends to a difference between navigational buttons and content buttons. These observations show that although the child's communication with and through the AAC may not conform to their interlocutors' social expectations of accuracy or to designers' intentions regarding the use of AAC systems, her use of AAC has communicative value and potential in its communicative context. Acknowledging children's creative uses of AAC may help their interlocutors, AAC designers, educators, and

technical communicators to consider how we may work alongside children to reconfigure human-AAC technology assemblages in ways that attend to a variety of communication strategies.

An example of this acknowledgement of children's unconventional AAC use can be observed in Chapter 4, Clip 4.2. In this interaction, the mother asks the child "what do you want to do" in response to the child's embodied actions showing her attention to the scissors her mother is holding. When the child responds by selecting the "my turn" button rather than the "cut it" button, the mother reworks her question and her actions with the toy scissors in order to acknowledge the child's request for the scissors. Likewise, we as technical communicators should consider how we can create support materials that attend not only to narrow technical descriptions of technologies like AAC, but also to the ways that technologies are integrated into complex contexts and interactions. We should consider how our work privileges certain strategies and modes of use and how we might expand our work to acknowledge and value users' creative and non-normative modes of interaction.

R2: What are the implications of families' interactions with and through AAC for usability and accessibility research in technical communication?

Following the need identified above to acknowledge and foreground users' diverse interaction strategies and the complex environments from which these strategies emerge, this project additionally questions how users' strategies and contexts may be more thoroughly addressed through usability research. In Chapter 5, I argue that usability can be understood as emergent in human-technology assemblages. Usability, on this view, is not necessarily the extent to which a singular technology is convenient or easy to use, but rather it concerns the ways that the interactions of human-technology assemblages may provide beneficial opportunities for users (Gibson et al., 2012). Improving the usability of technologies then, requires examining how different components of human-technology assemblages may be reworked or better address the needs of users. In Chapter 5,

I show that although the child's interactions with the AAC may not adhere to the conventional expectations for conversation (she does not respond to her mother's yes/no question by selecting the "yes" or "no" buttons on the AAC), her embodied interactions with the AAC and with her mother enact certain ways of orienting to the AAC device and its role in their communication. Namely, her actions show that she tries out different buttons and combines them with similar hand gestures and body movements searching for a combination that will prompt her mother to shake the toy block. Attending to users' strategies shows that the use of the device may take different forms for different users. Through observing users' interactions in local environments, usability research can better include diverse ways of interacting.

Ultimately, I argue that communication technologies like AAC are better understood as elements of interactional ecologies rather than as tools or resources for singular rhetorical purposes. The challenges that the families and children in my project encounter when integrating AAC technologies emerge from assemblages of actors and are negotiated and reconfigured through interactions within these assemblages. For people with disabilities, this shift in the ways that we understand usability means that technologies are not only tools and are not the source of agency or the providers of independence, but rather that technologies, along with various actors help to shape interaction in unexpected ways. Consequently, to improve this interaction we need to explore relations among these various actors. As technical communicators, we need to explore how we can reflect these networked interactions in the resources and materials we produce to guide users' experiences with technologies.

R3: What are the implications of the families' interactions with AAC for notions of agency in human-technology assemblages?

The final question this project takes up recalls my discussion of agency and independence in Chapters 1 and 2. In these chapters, I outline an approach to agency that is posthuman,

interdependent, and emergent in human-technology assemblages. On this view, posthuman agency takes the form of *possibilities for action* that emerge from the interactions of actors within assemblages. Agency is brought about through interdependencies of humans and technologies. This view of agency stands in contrast to popular rhetoric surrounding technology use by people with disabilities. Such rhetoric often figures agency and autonomy in opposition to dependency where gaining independence through technology use means gaining agency. Posthuman approaches to technology acknowledge that bodies are entwined in interconnecting systems of humans, services practices, technologies, cultural ideologies, and a variety of other factors. On a posthuman view, agency is gained not in throwing off these relationships, but in the productive reconfiguring and honing of the assemblages, and in the examination of breakdowns at the boundaries of these human-technology assemblages. Interrogating human-technology boundaries makes visible breakdowns, ruptures, sutures, and fissures in human-technology assemblages that better reflect and acknowledge the lived experiences of people with disabilities interacting with technologies. Moreover, these spaces of breakdown provide ways to acknowledge and understand the work that people with disabilities do in managing and caring for relations in their human-technology assemblages. Their tinkering brings about a dynamic agency of becoming where reconfigurations in the assemblage bring about new possibilities for action.

Contributions to Technical Communication

My work contributes to recent technical communication research on posthuman interagency and offers the field a unique methodological approach to studying technology adoption and usability. Technical communication scholars have long been concerned with understanding how the work of technical communication emerges from complex networks (Spinuzzi, 2001). The insight from this research has led scholars to expand notions of usability and to explore how the interactions of various different actors, objects, texts, and systems impact usability. Recently,

technical communication scholarship has called for researchers to expand our notions of context and adapt our methods to better address the increasingly complex environments into which technologies are incorporated and the localized needs of users and communities (Agboka, 2013; St.Amant, 2018). In order to understand usability as emergent in networks, technical communication scholars have drawn on new materialist and posthuman theories of agency to better understand how “all things (objects, constructs, bodies) relate” and how these relations create effects (McNely & Rivers, 2014). My work adds to this vein of technical communication research by exploring how the usability of AAC technologies extends beyond concepts such as ease of use. Specifically, my research expands the purview of technical communication contexts and methods to account for the ways that technology adoption and usability emerges from embodied collaborative micro-interactions of people and technologies. Drawing from work by Mol et al. (2010) I frame technological adoption as practices of care made up of iterative changes to human-technology assemblages. To this end, I examine how local tinkering can reveal usability challenges and how users’ tinkering practices also work to negotiate and rework these challenges.

The project presented here brings to TPC research, a fine-grained analysis of both human and nonhuman embodied interactions considering how these different actors impact unfolding interactions and the usability of technologies. These observations reveal the interdependences of communication and stress the importance of viewing usability as emergent in collectives rather than as the result of isolated technical characteristics or user practices. This project further emphasizes the importance of figuring agency in human-technology relations as interdependent. Consequently, I argue that TPC scholars and practitioners must carefully examine the ways that we frame technology use and the ways that we describe technical features to better address the complex assemblages into which technologies are integrated. Ultimately, I argue that this posthuman-interdependent approach to agency can help technical communicators to interrogate rhetoric that enacts normative and ableist

assumptions regarding the use and value of technologies for people with disabilities. Rather than positioning technologies as agency givers for people with disabilities, technical communicators should work to acknowledge the distribution of agency in human-technology relationships, identifying inequalities and working alongside people with disabilities to improve the relations in their human-technology assemblages.

In addition to its theoretical contributions, my project offers a unique methodology to technical communication research. As part of a mixed-methods approach, I employ conversation analysis to closely examine video data of participants interacting with each other and AAC technology. Video data provides a rich source for studying users' embodied relationships with technologies and texts. This method enables me to examine the micro-level elements of interaction that are typically left out of rhetorical accounts of communication, such as the coordination and sequencing of gestures, facial expressions, eye gaze, utterances, and bodily orientation. I consider how these elements of human interaction intermingle with nonhuman elements such as computer-generated sounds, screen displays, physical space, and toys. Attending to relationships among these micro-elements of interaction has potential to open up new insights into the ways that we do the work of care—caring for ourselves, each other, technologies, and for relations within our networks. By interweaving posthuman theoretical approaches with conversation analysis, my research offers new insights into the ways that macro-level concepts such as agency and independence can be enacted through and shaped by micro-level interactions with technologies. My findings highlight the need to examine usability and technological adoption from a network approach where possibilities for future action emerge from the micro-interactions of humans and technologies.

Finally, this project is concerned with considering the impact of social justice issues of representation, inclusion, and accessibility on TPC research methodology and technology design. I propose that this study's methodology can provide an additional way to include users like the

children in this study who face barriers to participation in typical user-centered research. Through this methodology we can take seriously users' strategies and interaction practices and draw on users' practices as points of reference in working toward more accessible and inclusive technologies and technical communication.

Directions for Future Research

I plan to extend the research presented here through two projects: a methodological study exploring video analysis in usability testing and a community engagement-oriented project. First, I will extend my discussion of usability in Chapter 5 by developing a methodology for integrating video analysis in usability research. Secondly, I plan to develop a community engagement project aimed at developing training materials for children and families who are learning to use AAC technologies. For this project, I will first survey existing technical documentation resources and training materials that support AAC use. I will work with families, speech language pathologists, AAC designers, and technical communicators to consider how these materials could be improved and to produce resources that address the interactional challenges that families encounter when integrating AAC into their daily communication.

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APPENDIX A

Transcription Key

Symbol	Description
MOM	Utterances, gestures, or gaze of the mom
DAD	Utterances, gestures, or gaze of the dad
CHILD	Utterances, gestures, or gaze of the child
THER	Utterances, gestures, or gaze of the therapist
SLP	Utterances, gestures, or gaze of the speech language pathologist
AAC	Utterances produced by the device's computerized voice
[word, gesture, or gaze] [word, gesture, or gaze]	Overlapping interaction
((word))	Descriptions of or comments on interaction
()	Utterance that is indecipherable in the audio data
(word)	Uncertain transcription
:	Lengthened syllable
=	Turns that are latched together with no pause or break between
word-	Word or phrase that is cut off
↑word↓	Rising and falling pitch
.	Falling intonation at the end of an utterance
,	Level intonation at the end of an utterance
?	Rising intonation at the end of an utterance
°word°	Utterances produced in a soft or quiet voice
>word<	Utterances produced with a quick pace
<word>	Utterance produced with a slower pace
(h)	laugh
.h	inhalation
h	exhalation
(.)	Pause of less than a second
(Xs)	Pause or interaction that last X seconds

APPENDIX B

Pre-camp Interview Questions

How old is your child?

For what reasons does your child need a communication device?

How long has your child used an AAC device both at home and at school?

What kinds of AAC devices has your child used in the past, if any, and what was your and your child's experience with those devices? How did you come to select his or her current device? What has been your and your child's experience with this current device?

Have you observed any changes in the way your child communicates since s/he started using the AAC devices, or this current device?

Can you describe your experience communicating with your child both with and without the AAC device?

Have you experienced any benefits or challenges in communicating with your child both with and without the AAC device?

Do you have any strategies for communicating with your child both with and without the device?

Are there any situations in which your child has particular difficulty communicating? Either within or outside of home, with certain people, at certain events, etc.?

If you do have any difficulties communicating with your child, what do you usually do? What does your child do?

In what situations does your child use his/her device in your daily interactions at home? What about outside of your home?

Are there any thoughts, needs, or ideas that your child likes to communicate without using his/her device?

What are your feelings towards your child's AAC device?

How does your child think or feel about his/her AAC device?

What do you hope that you and your child will gain from your participation in the summer camp?

Is there anything else that you would like to tell me about your and your child's communication?

Post-camp Interview Questions

Can you describe your experience at the camp this summer? What experiences or aspects of the camp made the biggest impression on you, your family, and your child?

What were your experiences in the video-recorded sessions at camp?

Prior to coming to camp, what goals (for yourself and your child) did you hope could be accomplished through camp?

Did you feel that these goals were reached? Please explain.

What strategies or techniques did you observe speech language pathologists, camp volunteers, other families, and children using to promote communication at camp? Which strategies seemed useful or helpful for your family and why? Which ones were less effective and why?

Can you describe your communication with your child at home after camp?

Did any of the experiences or aspects of camp influence your daily communication at home?

Are any strategies from camp difficult or easy to practice in your daily communication with your child? What do you do when you have trouble with these strategies?

Based on your experience at camp, did you get any ideas that you would like to try outside of the home, for example ideas for your child's school, SLP, socializing, etc.?

What do you do when you have difficulties communicating with your child? What does your child do?

Is there anything else that you would like to tell me about your and your child's communication or about your experience at camp?

CURRICULUM VITAE

for
Mary Clinkenbeard

EDUCATION

Ph.D., Professional and Technical Writing	May 2019
Department of English University of Wisconsin–Milwaukee	(expected)
Dissertation: <i>Agency at the Seams: A Posthumanist Approach to Disability in Family Interactions with Communication Technologies</i>	
Graduate Coursework in Linguistics	2012-2014
Department of Linguistics University of Wisconsin–Milwaukee	(transferred)
M.A., Applied Linguistics and Teaching English as a Second Language	2011
Department of English Oklahoma State University	
B.F.A., Fine Arts	2005
Department of Art and Design The University of Kansas	

AWARDS

University of Wisconsin-Milwaukee	2018-2019
Distinguished Dissertation Fellowship	
Graduate School	
Frederick J Hoffman Award for Best Graduate Student Paper	2018
Department of English	
Graduate Student Excellence Fellowship Award	2017-2018
Graduate School	
Chancellor's Award	
Department of English	2014
Department of Linguistics	2012
Oklahoma State University, English Department	2010
Harry M. Campbell Scholarship for Outstanding MA Student	
Pass with Distinction MA Comprehensive Exams:	
Testing & Second Language Acquisition	

PUBLICATIONS

- Clinkenbeard, M. A posthumanist disability studies approach to agency and technology in social interactions. Submitted to *Technical Communication Quarterly*. (Under review).
- Clinkenbeard, M. Book Review: *Posthuman Praxis in Technical Communication*. Kristen Moore & Daniel Richards (Eds.). *Technical Communication Quarterly*. (Submitted).
- Clinkenbeard, M. (2018). Multi-modal conversation analysis and usability studies: Exploring human-technology interactions in multiparty contexts. *Communication Design Quarterly*, 6(2), 103-113.
- Clinkenbeard, M. (2017). Book Review: Najma Al Zidjaly, *Disability, Discourse and Technology: Agency and Inclusion in Interaction*. *Discourse and Society*, 28(6).

RECENT PRESENTATIONS

- Using Conversation Analysis of Video Data to Hold UX Accountable to Local Contexts and User Needs. (2019). *Association of Teachers of Technical Writing*. Pittsburgh, PA.
- Exploring a social justice approach to teaching technoscience communication for engineering students. (2018). Co-presented with Geoffrey James Gimse. *Association of Teachers of Technical Writing Conference: Precarity and Possibility*. Kansas City, KS.
- A disability studies approach to agency and technology in social interactions. (2018). Presenter, panel co-organizer & chair: Technologies and Social Action Across Contexts. *Georgetown Roundtable: Approaches to Discourse*. Washington, D.C.
- Extreme ease, unlimited options: Programming assistive communication technology for children. (2017). *Association of Teachers of Technical Writing: Celebrating 20—Retrospections and New Directions in Technical Communication*. Portland, OR.
- A posthumanist take on agency in the interactions of a speech language pathologist and a child who uses AAC technology. (2017). *American Association of Applied Linguistics*. Portland, OR.
- Conversational narratives in an interaction involving AAC technologies. (2016). Co-presented with Dr. Patricia Mayes. *The National Communication Association Convention: Communication's Civic Calling*. Philadelphia, PA.
- An analysis of the features of collaborative repair in augmentative and alternative communication. (2016). Co-presented with Dr. Pat Mayes. *Atypical Interaction Conference*. University of Southern Denmark. Odense, Denmark.
- The power to define: Abilities, bodies, and technology through the perspectives of people who use AAC. (2016). *Rhetoric Society of America Conference: Rhetoric and Change*. Atlanta, GA.
- Identifying referents in everyday conversation involving augmentative and alternative communication systems. (2015). Co-presented with Dr. Pat Mayes. *Language and Social Interaction Working Group (LANSI)*. New York, NY.
- Perceptions on synthesized speech by individuals who use AAC. (2014). Co-presented with Drs. S. Lund, P. Mayes, Y. Hu, & H. Warren-Crow. *International Society for Augmentative and Alternative Communication*. Lisbon, Portugal.

WORKSHOPS & INVITED PRESENTATIONS

- Exploring families' use of communication technology for children with disabilities. *Big Ideas for Doctoral Students at the Wisconsin Science Festival*. Milwaukee, WI. 2016.
- Repair in conversation involving augmentative and alternative communication systems. Co-presented with Dr. P. Mayes. *Data Session at the University of Wisconsin-Madison*. 2015.
- Comp in the community: Milwaukee-based pedagogies. Co-presented with C. Carpenter, F. Cline, F. Mastrangelo, P. Siegmann, A. Sperling, and T. Wray. *Spring Comp Forum, University of Wisconsin-Milwaukee*. 2015.
- Exploration communication between an AAC using participant and a caregiver. Co-presented with Dr. P. Mayes. *Data Session at the University of Wisconsin-Madison*. 2014.

ACADEMIC TEACHING EXPERIENCE

- University of Wisconsin–Milwaukee, Graduate Teaching Assistant 2012-2018
Instructor of Record
Writing, Speaking, and Technoscience in the 21st Century (6 sections)
Business Writing (2 Sections)
College Writing and Research (English 102 - 1 Section)
Introduction to College Writing (English 101 - 5 Sections)
Advanced College Writing in English as a Second Language (1 Section)
College Writing in English as a Second Language (3 sections)
Immersion B – Cultural Communication (Intensive English Program - 2 sections)
Writing Class 1 (Intensive English Program - 2 sections)
- Oklahoma State University, Graduate Teaching Assistant 2009-2011
Instructor of Record
International Freshman Composition I (3 sections)
Writing Center Tutor (2 semesters)

RESEARCH EXPERIENCE

- University of Wisconsin–Milwaukee**
Student Researcher 2012-2016
Assisted Dr. Mayes to collect, transcribe, and analyze video data for “21st Century voices: Synthesized speech in the new millennium”, an interdisciplinary research project at the University of Wisconsin-Milwaukee, funded by the Center for 21st Century Studies.
- Oklahoma State University, Supervisor, Gene Halleck** 2010
Research Assistant
Conducted a needs analysis, and developed and implemented a test of English proficiency for international teaching assistants.

CURRICULUM DEVELOPMENT & ADMINISTRATIVE EXPERIENCE

Member of the UWM Composition Program's Accessibility Working Group 2018
Worked with a team of Composition Instructors to research and develop resources to address issues of accessibility and disability in writing courses.

Project Assistant, English Department & Associate Dean of Humanities 2016-2018
Collected events and composed a weekly newsletter for the college of L&S. Assisted Dr. William Keith to survey instructors and construct teaching schedules.

English 310 instructor and member of development team 2016-2017
Met weekly with Supervisor Dr. William Keith and other teaching assistants to discuss, revise, and improve the English Department's communication course for Engineers (English 310: Writing, Speaking, and Technoscience in the 21st Century).

ADDITIONAL TRAINING

Summer Institute for Advanced Conversation Analysis (2017)
University of Colorado, Boulder

Linguistics Summer Institute (2013)
University of Michigan, Ann Arbor

ADDITIONAL TEACHING EXPERIENCE

Madison English as a Second Language School 2011-2012
English Instructor

Family Resource Center, Stillwater, Oklahoma 2010
Community Development Assistant

Sanda University, Shanghai, The People's Republic of China 2005-2007
English Instructor

ACADEMIC SERVICE

- * Volunteer at The Center for 21st Century Studies Conferences: *Landbody* (2016) & *The Big No* (2017)
- * Facilitator for UWM's University Common Reading Experience for undergraduate students, Fall 2015
- * Ph.D. Student Representative for the Linguistics Department, 2013-2014
- * Secretary for the TESLing Club at Oklahoma State University, 2009-2010