

Article

Becoming Protactile: Interactional Foundations of Protactile Language Development and Language Emergence

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Abstract: During the COVID-19 pandemic, many DeafBlind children were left without access to educational services when schools went remote. This article presents findings from a project that brought DeafBlind adults into the homes of DeafBlind children during a historically unprecedented time, when a new language was emerging among DeafBlind people who call themselves “Protactile”. In analyzing interactions between the DeafBlind adults and children, we have gained new insights into how novel communication channels are forged intersubjectively. We focus our analysis on Jelica, a DeafBlind member of the research team and experienced Protactile educator, and her interactions with two DeafBlind children. Grounding her extensive field notes in an anthropological theory on intersubjectivity, her insights show how they gradually became attuned to each other and their environment, thereby laying the foundation for intention attribution and joint attention. Jelica does this, in part, via frequent use of “Protactile taps”, which have attention-modulating and demonstrative functions among adults. Jelica’s taps perform a “meta-channel” function to direct the child to use particular parts of their bodies for communication and exploration. This study shows how Jelica establishes an operable environment, within which the vocabulary and grammar she exposes them to will take on situated meaning. This research builds on previous work on language emergence by showing that both children and adults contribute to language emergence as they adjust to one another in the unfolding of interaction. Finally, this research calls attention to the need for DeafBlind adults to have institutional authority to shape communication practices for DeafBlind children.

Keywords: intersubjectivity; Protactile language; DeafBlind; language development; language emergence; interaction



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1. Introduction

During the COVID-19 pandemic, when children were sent home to continue their schooling remotely, many DeafBlind children were left with little to no access to educational institutions and services. This article presents findings from part of a larger project that brought DeafBlind adults into the homes of DeafBlind children in order to understand how they could continue their learning under conditions of social distancing. In doing so, the project also sought new insights into the interactional foundations of language emergence.¹ This project was carried out in a historically unprecedented time, when a new language was emerging among DeafBlind people who call themselves “Protactile” (Clark 2024; Granda and Nuccio 2018; Johnson 2022; McMillen 2015). Protactile language and communication practices have emerged out of a socio-political movement that has worked to relax sighted social constraints on touch and create spaces where DeafBlind people can experiment and innovate on their own terms—in a Protactile way—without interference.

In this article, we focus on a series of visits between Jelica, a DeafBlind member of the research team, who is an experienced Protactile educator and researcher,² and two

DeafBlind children we call “Jad” and “Ana”. The children were both 3 years old at the time and had no exposure to Protactile practices prior to the study.³ The weekly visits took place in the children’s homes over the course of 4 months (December–April 2020) and generated approximately 250 h of video-recorded interactions.⁴ In addition to analyzing those recordings, we also analyze detailed and extensive field notes, recorded by Jelica after each visit with the children. In her field notes, she provided detailed descriptions of the interactions with the children along with her reflections on the decisions she made and why. She also recorded conversations she had with parents and her subjective view on her progress with the children.

This set of circumstances is highly unusual. DeafBlind adults are rarely, if ever, directly involved in the education of DeafBlind children, and if they are, it is even more unlikely that they would be granted decision-making authority over how educational settings are structured. This unequal authority structure is, in part, an outcome of broader social and historical processes. Over the past several decades, a national trend of “de-institutionalization” and “mainstreaming” has affected Deaf students’ ability to acquire language from Deaf language models since they are likely to be the only Deaf person in a classroom where spoken English is the language of instruction (Snoddon and Weber 2020). This same trend is affecting DeafBlind children. Even with cochlear implantation, DeafBlind children do not readily acquire spoken language (Dammeyer 2009), and yet, most DeafBlind children are educated in spoken language environments, sometimes with a one-on-one aide. Most of these classroom aides do not receive any specialized training that would prepare them to work with DeafBlind children. As a result, they often resort to using idiosyncratic communication systems. A meta-review of the literature shows that, out of seventeen reports of communication strategies used with DeafBlind children, nearly all focused on the effectiveness (or not) of “microswitches”, “augmentative and alternative communication” or “AAC” devices, “object symbols”, and “communication boards” (Parker and Ivy 2014, pp. 693–4). These tools are generally one-way communication devices used by sighted teachers and aides to establish basic communication functions, such as requests for food, play time, or the restroom. For example, tangible or whole objects are used as “object symbols” which represent things, people, places, actions, or ideas. To elicit the student’s desire or request for something, the teacher would present the student with these symbols, and then the student would respond by touching or pointing at one of the objects. These objects are part of a simple communication system that meets the child’s basic needs; children use them for simple requests, commands, and directives such as asking for food or telling the adult they need to use the bathroom. Due to the limited set of symbols, the lack of grammar, and the absence of any communication that falls outside of the set, these tools do not support complex, layered interactions.

This article documents Jelica’s approach, which is, instead, rooted in reciprocal tactile communication. In this sense, Jelica receives input from the child and her environment in roughly the same way that the child would if the child was in her position, and vice versa (Schutz 1970). From there, rather than starting with pre-set object symbols with rigid meanings that do not dynamically shift according to context or situation, Jelica started with an exploratory process that we can begin to understand by applying a framework of “intersubjective attunement”. “Intersubjective attunement” is a term that has historically referred to the development of joint activities between infants and parents, and their attunement process in interpreting actions, emotions, and desires of others (Rommetveit 1998; Bråten 1998). Expanding on this concept, Duranti and La Mattina (2022) operationalize this interactional process from a semiotic perspective.

Duranti and La Mattina (2022) define intersubjective attunement as “a process of adjustment that recognizes the exposure of any cooperative activity to breach, failure, or inadequate completion, resulting in its incrementally fluid and glitchy quality” (Duranti and La Mattina 2022, p. 87). They list five domains where this process can play out: “sensorial access, distributed intentionality, fluctuations of attention, improvisation, and negotiable role ascription” (p. 91). First, attunement to another is not possible without

“sensorial access” to co-participants, objects in the immediate environment, and other aspects of the situation, whether in face-to-face contexts or mediated (e.g., by technology). However, sensorial access is also not enough, since participants enter into any activity with different expectations, skills, and forms of knowledge. Therefore, intentionality, or the directedness of mental states, is distributed across participants and is part of what is worked out as they adjust to one another and to the situation (e.g., “distributed intentionality”). Within these parameters, participants may be more or less attentive moment to moment across contexts and stages of development (“fluctuations of attention”, p. 92). In terms of “improvisation” and “negotiable role ascription”, we improvise, “tinker” and “experiment” as contingencies arise in an interaction, and co-engagement requires people to take on specific roles within a social structure (p. 93).

There is not much known about the process of intersubjective attunement that is culturally shaped by Protactile language and social practices. Based on these ethnographic field notes and corresponding linguistic analyses, we ground our analysis of these interactions in this theory of intersubjectivity. We also contribute to Duranti and La Mattina’s framework by delving into the conditions required to render “sensorial access” meaningful. The main research questions are as follows:

1. What does the process of establishing intersubjective attunement look like in a situation where the adult and child are coming from different environments?
2. What kinds of linguistic devices are prioritized in the presence of DeafBlind children for Protactile language development and socialization?
3. How do the analyses of these linguistic devices and interactional processes inform theories of intersubjective attunement?

At the outset, Jelica did not restrict herself to Protactile (PT) vocabulary, grammatical rules, or communication conventions. She also did not focus on individual object symbols as a means of accomplishing individual communicative tasks. Instead, she tried to establish a basis for co-engagement via a tactile channel, which is possible through touch. In other words, she worked to establish sensorial access, which is foundational for interpreting the child’s intentions and vice versa. In one of her first field note entries she writes:

I (Jelica) am focused on connecting with the child and our shared environment through touch.

To an outsider, this goal may seem like an obvious starting point. However, within the field of DeafBlind education, there is a tendency to focus on whatever residual sensory capacities each child has (e.g., vision and audition) and those capacities differ so much across individuals that there is rarely one common mode of communication suited to all. When interlocuters have different expectations about communication through specific senses, reciprocal communication becomes difficult to achieve. In choosing to focus on touch, Jelica was aiming for reciprocity. In this sense, her approach was “Protactile”. However, she did not “teach” the children the Protactile linguistic conventions that have emerged among DeafBlind adults. Instead, she focused on building reciprocity by activating tactile channels and socializing the children into the Protactile way of establishing joint activity and attention to their environment. She reflects on the contrasts between her and the parents’ theories about language acquisition after a meeting with Ana’s parents:

Both parents really wanted to know PT words—this is where I was inclined to give them more explanation over time so they can absorb what PT means. I didn’t want to be rushed into giving them things they aren’t ready for. Patience and time are what is needed here, so they can experience touch themselves first. I don’t want to come in with ready “answers”. It is important that they experience this together to develop an understanding—it’s not about getting a list of vocabulary items right away. I explained that Ana would give us words—that we needed to learn from her.

Jelica viewed that vocabulary as something that would emerge out of an exploratory process of establishing a tactile channel in a slow and integral way. Her primary focus was on touch, or in other words, achieving “sensorial access” (Duranti and La Mattina

2022). She anticipated that reciprocal, tactile interactions with the children and their learning of tactile indexical signs and meanings in the environment would lead naturally to the emergence of new vocabulary tied to everyday routines and experiences of the children and their interactions with others (e.g., sleep routines, meals, proper names). She also expected established vocabulary to be woven into associations that arise out of interaction, as opposed to simply being memorized as abstract symbols. While this paper does not foreground language emergence and the children's role in language emergence, our analysis provides evidence that reaching intersubjective attunement prompts the children to develop the ability to ascribe meaning to words and attribute intentions to others' actions. If this is the case, then our study serves as an important complement to prior research on language development and emergence, which has not examined in depth the role of interaction and intersubjective attunement in shaping language on different timescales (Goldin-Meadow 2010; Senghas et al. 2004; Senghas and Coppola 2001). These interactions could be alternatively interpreted as a phenomenon of "language teaching", but we argue that Jelica is attempting to solve the problem of "sensorial access". In addition, Jelica is actively seeking opportunities to innovate *with* the children, as we will learn in what follows.

This article also contributes to previous work on the tactile dimensions of interaction (Goodwin 2017; Goodwin and Cekaite 2018; Streeck et al. 2011), and to a growing body of work on interaction in DeafBlind communities (see Willoughby et al. 2018 for review). In particular, we show not only how tactile interaction can be structured, but how that structure begins to emerge in interactions with DeafBlind children. In order to examine that process, we begin in Section 2 with the problem of "sensorial access" as Jelica began to establish communication. Here, we foreground the sensory–environment relation and show how that relation is conceived of from a Protactile perspective. In Section 3, we track weeks of awkward experimentation, glitches, and adjustments and show how these processes led Jelica to recognize patterns in what the children were attending to and what their actions were aimed at. We find that Jelica did not exactly *attribute* intentions to the children. Rather, she *proposed* intentions and then sought evidence for her proposals in the interaction, which allowed her to go beyond the mere transmission of conventional symbols and acts, and enter into a creative and collaborative process with the child.

While Jelica's field notes gave us great insight into her strategies of attuning to the child, it was harder to know what the children were experiencing internally or their intentions when they did not yet express themselves in a conventional Protactile way. Thus, our analyses focus mostly on Jelica's input—both non-linguistic and linguistic—all of which have the underlying goal of establishing intersubjectivity. Even though Jelica did not focus on Protactile words in the interactions at this point, she made great use of a particular resource, called "Protactile taps". PT taps have become incorporated into the lexicon and grammar of PT language (Edwards and Brentari 2021). All PT taps, at some level, serve to modulate attention between participants. In the current data, PT taps were ubiquitous. Because their function among adults is to modulate attention, these taps were a good entry point into understanding the child's role in intersubjective attunement. In Section 4, we identify instances of PT taps produced by Jelica and systematically analyzed the child responses in the unfolding of the interaction.⁵ In Section 5, we summarize our findings and in Section 6, we discuss their broader significance for our understanding of theories on intersubjective attunement and for DeafBlind education.

2. Gravitating to the Perimeter

Jelica's first task in establishing some form of communication was to establish *sensorial access*. She would need to be able to touch the child and vice versa, and then establish joint access to the situation and the objects of attention within that frame. However, Jelica and the children were constantly surrounded by obstacles. For example, after her first visit with Jad, she recounted the experience of entering the home for the first time in her field notes:

We walked pretty fast from the entryway to meet Jad. I wasn't sure exactly about the layout of the house. I knew where we had entered, and that Jad's father had his office off the hallway. At the garage door, we stopped to feel Jad's wheelchair where it was parked opposite. [...] From there I felt like we were suddenly in front of Jad and I was not sure exactly about the layout between the wheelchair location and where Jad was situated. The surroundings weren't clear to me.

Jad was in a spinning chair near a sofa. His mother explained to Jelica that the teachers usually sit on the sofa and Jelica was excited to work out how they could sit there together. However, Jelica explained in her field notes that:

His mother meant that the adults would sit on the sofa while Jad stayed in his chair at a distance. This meant he would need to depend on his eyes/vision and hearing to connect with us. I didn't realize this until after we were seated on the sofa and I got a better sense of where we all were situated to one another in the room.

Given an environment structured according to sighted conventions, sensorial access was not possible, and therefore, intersubjective attunement was not possible. To remedy the situation, Jelica needed to remove physical obstacles that stood in the way between herself and Jad. However, the problem of being in a shared environment free of obstacles is not something that can be resolved once and for all. Jelica explained, for example, that even after she and one of the children had found a way to sit on the floor together to maintain physical contact, they had a tendency to gravitate to the perimeter of the room. Jelica explained this dynamic in her field notes:

In Ana's house, there was a room set up with the very center open area devoted to our co-activity. However, Ana and I found ourselves inevitably gravitating to the perimeter of the room where we could feel ourselves coming in contact with the washing machine and dryer, the back of the garage door, and the shelves along the opposite wall. Sighted parents and caregivers were concerned about safety and would invariably pull us back from the periphery to the center. It was clear that for the sighted, the comfort zone was in the empty space in the middle. In contrast we DeafBlind people, gravitate toward edges.

While Jelica and the children sought edges and borders in the room, sighted parents were generally more comfortable with their children being in the center of the room, away from clutter, shelves, furniture, and as they saw it, other potential hazards. This tension led to negotiations that over time were backgrounded, but never fully resolved.

From a tactile perspective, the perimeter of the room contains structure, such as the "shoreline" where the wall meets the floor. The shoreline reliably leads to the door, the couch, and other relevant destinations. Unlike movable objects such as chairs, in a typical house in Oregon, walls are reliably there. Being in contact with one, for example, leaning back against a wall while interacting with another person, keeps trajectories to the door, the couch, and other destinations in awareness and leads to an overall sense of being oriented. The center of the room, in contrast, is lacking structure, and therefore possibilities for action such as tactile orientation and navigation. In a sighted space, Jelica is being critically evaluated from a sighted perspective, making the first, most basic steps toward intersubjective attunement with the child difficult to achieve. Jelica reflected in the following quote:

Reflecting more deeply on the dynamics of our interactions during this visit, I have continued thinking about how [the child] and I relate and interact while surrounded by a sighted audience. Their gaze/presence carries a field of anticipatory energy that infiltrates [our] interactions and shifts things to a sighted way of being without them even knowing it. I feel this energy as it is conveyed to me, and I recognize that it throws me off center as I am working. I realize that they may feel compelled to get involved to express their concerns—either concern directed toward me, my proximity to objects or that I might hit my head for example, or concern about what I am doing, OR, mom is concerned about her

daughter's well-being. So, [the child] and I are two DeafBlind people, interacting under a sighted microscope.

Jelica explained that the parents' interventions almost always arose out of a concern for their children's safety, which is valid. However, the parents' responses were not to provide more access to the environment or more information, but instead to bring cushions or pads over for the child. Their goal was to protect their child from potential hazards in the environment, but cushions and pads also create distance that prevents tactile access.

I (Jelica) understand mom's main concern is around her daughter's safety, at times Ana does [...] buck and flail and could crack her head on something nearby. That is a valid concern. But then in response, mom brought over a padded object to cover the corner and prevent an accident. Okay, but this type of involvement from her and [others] invades the relationship Ana and I have with the space around us and with one another. When things are pushed out of our reach, or we are encouraged to move away from corners or tables, it prevents us from knowing how close we are to them as we interact within the environment.

The tension between safety from the parent's perspective and removing obstacles in the environment from Jelica's perspective persisted. When Jelica attempted to uncover new tactile affordances in a sighted space, such as using the edges and borders of rooms and furniture, this was perceived by the parent as potentially unsafe. Where she succeeded, she entered into a slow exploratory process, trying to understand what counted as an affordance for each child, what kinds of objects might be meaningful to them, and what actions those objects called forth for them. This situation raises an interesting question for theories of intersubjective attunement: What is the difference between "sensorial access" and what Gibson (2015) would describe as "uncovering a meaningful environment"? For example, Jelica describes walking into a room with one of the children and coming across swatches with different textures and materials. She wrote about this encounter:

They do offer something interesting to touch, yes, but beyond that, what is their significance? What can they be associated with? Does Ana understand these kinds of associations? If these tactile items are introduced outside of any particular context, I can imagine a child not being particularly interested, because they are pure novelty in that case—with no point or meaning.

Here, the swatches do not provide the child with clear associations, such that these little square fabrics are associated with specific sofas or clothing articles. By touching the swatches, the child has perceptible access to the materials, but in this case, there is no meaning or context. In contrast, the place where the wall meets the floor, or the "shoreline", is contextualized. It is part of the room and contributes structure to it. One associates it with the places one can go from "here". The wall offers trajectories for action. By touching the wall, which is part of Protactile practice, one can uncover a meaningful environment. Sensory access alone is insufficient as a basis for intersubjective attunement. Rather, Jelica and the child required an environment that was meaningful and intelligible to both of them in corresponding ways. Converging on objects that were of interest, like toys, was only possible in an environment that contained pathways, places to sit, places to eat, and places to play. After the first month, Jelica described what it felt like to finally be situated in a meaningful environment with Jad.

One thing I noticed this week was how fast our hour and 15 min flew by. Jad and I were very relaxed, positioned on and in front of the sofa. I knew where everything was and how we were oriented. These past few weeks of practical experimentation have paid off because I think we have found our spot where we can sit comfortably with each other, our bodies close and connected. I can feel him and he can feel me. I can feel his emotions much more clearly through his actions and behaviors, and it seems he can feel me too, though we haven't shared any explicit communication or language yet. We have found a

shared tactile space where we can connect and I want to continue to interact together in co-presence so we can hopefully build from there.

Four weeks of awkward experimentation, mistakes, and adjustments led Jelica to a place where she felt she could observe Jad's responses to his environment and to her. Her capacity to interpret his actions laid the foundation, then, for tracking his attention and intentions and having some sense of whether and how he was tracking hers.

3. Tracking Attention and Intention

Insofar as physical obstacles could be negotiated and tactile contact could be maintained, Jelica was able to discover more, and her grasp of the environment grew stronger. This was, again, not only a matter of sensory access. The environment's contours were revealed through a continuous process of attunement to the kinds of things children responded to and what their responses meant. For example, one child's muscles tensed up sometimes, and Jelica learned that this happened when the child was crying. Another important response was repetitive movement of the feet and legs, which for one of the children meant excitement, joy, or interest. She wrote the following in her field notes about her efforts to establish those associations:

I am doing a lot of experimenting to find and establish a relational tactile ground in which the children and I can connect so we aren't misunderstanding each other's intentions.

Jelica explained that early on, she spent entire visits learning to read these signals, and reading those signals was a means of mapping out the quality of attention exhibited by the children in different contexts.

From there, Jelica learned how to follow the children's exploratory activities to find out what they were attending to, and how. Jelica noticed that Ana used her mouth to explore her environment, such as chewing or teething on objects, but this would be inappropriate according to Protactile conventions (Figure 1). In a Protactile interaction, one would follow another interlocuter's hands if both hands were in contact throughout the activity. However, if the interlocuter was using their mouth to explore objects, then the other interlocuter would not be able to follow this activity. To reduce Ana's chewing behavior, Jelica would give her a mouthpiece, tap on her face just to the right of her mouth, and repeatedly say NO in Protactile language. Another motivation for discouraging Ana to explore the environment via her mouth was that the correspondences between how the hand interacts with objects in the world, and how it interacts with the hands of an interlocuter to represent those objects, were unavailable. It was not simply a matter of convention of how one should explore their environment. It was a matter of exploring the world in ways that could effectively be observed by, conveyed to, and participated in by others. After a visit with Ana, Jelica wrote:

I also wanted her to get accustomed to having her hand on the hands of others. I noticed how she was holding the wooden frame of the rocking chair and recognized that to be precisely how I wanted her to hold my hand and finger. So, I took advantage of the natural tactile association and put my finger up by the chair frame so she grabbed it instead of the chair. Once she had a hold of my finger, she took some time squeezing it, but then went right back to grasping the chair frame.

With Jad, the starting place was very different, but the process, again, began with careful observation of how the children expressed attention and intention. After her first visit with him, Jelica noted Jad's "surface-level" explorations:

I was trying to imagine what Jad's embodied experience of tactility might be. What tactile sensations might mean to him with his unique physical sensitivities and body movements. [...] The way he came into contact with me and with things—he did so broadly, with larger gross movements of his feet and hands. This led me to realize that he doesn't seem to be exploring his own body of the bodies of others yet. He used his body to contact ours, and used ours to get leverage as he spun [in his chair], but he didn't seem to explore with

depth, to get a feeling for the overall shape of the body, body part or object. Instead, he mostly came into superficial or planar/flat two-dimensional contact with the bodies of others and with objects. He seemed to interact tactilely just with the surfaces of things. [. . .]. He seemed to be responding possibly to vibrations at the surface, or any sounds or movements.

Jelica explained that most of Jad's interactions with her during the first visit involved pushing off of her with his feet to swivel himself around in his circular chair. She said, "I'm not sure to the degree that he wanted involvement with others. That was vague." But because he used touch and motion for this activity, she could observe it, and despite the fact that she was unsure what it meant to him as a form of contact with her (if anything), this offered an entry point into a process of attunement.



Figure 1. Interaction between Jelica and Ana. The image depicts a toddler-sized child with curly brown hair that is pulled up in pigtails who wears a white polka dotted shirt and is grasping the wooden handles of a chair, which is lying lopsided on the floor. Jelica is seated right behind the child, with her body in contact with Ana's body, and has her right hand on the child's mouth and left hand on the child's left upper torso. Ana was biting and exploring the chair through her mouth, but according to Jelica, it is not an appropriate way for a Protactile person to explore things in one's environment. Jelica gives Ana a pink mouthpiece and when Ana grasps it with her mouth, Jelica gives Ana an affirmative meta-channel tap (yellow hand) on Ana's upper body, conveying her approval of the child's behavior. (video source: Jan 8th visit).

After some experimentation with physical arrangements, Jelica found ways to observe Jad's responses to his environment. This allowed her to ask questions about intentionality. She wrote:

I got a sense of what it is like to interact with him—when he is happy, he likes to rock, and he sat on my lap for a while rocking forward and backward, then did the same while sitting on his mom. I learned what actions and behaviors could be communicative but these same actions and behaviors are also tied to him meeting his own physiological needs [e.g., self-soothing behaviors] as well. One question is how to disentangle those two. For example, him rocking forward and back, could take on an affirmative backchanneling function. Maybe I would begin to introduce affirmative backchanneling as he does this. Or couple his rocking with my own forward/backward rocking motion for him to feel. I'm not sure.

This uncertain process where intentions are proposed, more than attributed, was key to Jelica finding a genuine and reciprocal mode of engagement. She also encouraged him via the use of meta-channel taps and tactile manipulation of Jad's hands to use his body

in ways that would be useful and make his intentions interpretable and conventionally appropriate for PT people in Jelica's community. For example, she explained that Jad's hands were usually curled up into fists. She gently encouraged him to open his hands by sliding her hand down his upturned palm a few times, starting at the wrist and moving to the fingertips. She wrote:

[I am] really giving him the feeling of his fingers fully extended so they can come into contact more fully with his environment as he explores it.

Jelica was open to a wide range of signs as indicators that Jad and the other children were directing their attention to her and to things in the environment for purposes of performing actions that were meaningful to them, and she tried to understand them. Once she had some plausible interpretations, she would encourage them to proceed, but in ways that would be expectable in a PT environment.

As the weeks went on, Jelica noted a kind of fluency and an ability to detect disfluencies, or "glitches" in her interactions with the children. She started making comments like, "I feel that Ana and I have established a connection and I think we can finally check that box" or "She has gotten comfortable with me, at least comfortable enough to begin to be curious." Jelica also provided detailed descriptions of interactions where it seemed that the children were responding to her in expected ways. For example, Jelica frequently gave Ana her "chewie" in order to encourage her to stop exploring the environment through her mouth. Over time, Ana responded to this by turning her head toward the chewie and taking it in her mouth. Jelica asked how the presentation of the chewie and a conventional PT signal for drawing attention (a particular kind of tap) might function in a similar way in this context. Jelica wrote, "Her response feels just like a person responding to an attention getting tap."

As moments like these accumulated, Jelica felt that she and the children were aware of one another's presence in a shared environment (i.e., sensory access), that she could feel the children's attention wander off and then turn back toward her (fluctuations in attention), and that she could tell when she and the children were co-engaged (i.e., distributed intentionality). It is harder to confirm what the children were experiencing. In order to gain some insight into patterns in the children's interactional behavior that might offer some clues, we analyzed Jelica's use of "taps" and how the children responded to them. Our reason for attending to taps in the data was two-fold: First, when we initially reviewed the data, taps were ubiquitous. Second, given Jelica's focus on sensory access and the modulation of attention, taps seemed like a valuable resource, since, in PT language, these are precisely the functions taps have taken on.

4. The Child's Role

In order to understand the child's role in the interaction, we identified communicative events, which were bounded by changes in body positions and signs that attention was shifting to a new activity, for example, when they stopped playing with one toy and started playing with another. Within each event, we identified and counted taps produced by Jelica and we coded the children's responses in ELAN ([ELAN \(Version 6.4\) \[Computer software\] \(2022\)](#)). Drawing on [Edwards and Brentari \(2021\)](#), we categorized the taps. They found that a decade after the inception of the Protactile movement, there were four types of taps that differed systematically in terms of both form and function (pp. 10–11). These included "backchanneling" taps, or taps "used to signal continued attention or agreement", two types of demonstratives ("exophoric" and "endophoric"), or forms that are used to single out a referent against a horizon of other, possible referents, and a tap that is used for language-internal, grammatical purposes ("proprio-tactile taps"). All four types of taps, despite their differences, share an attention modulation function and work to coordinate sensory and other forms of access. For this reason, we expected taps to be important as Jelica worked toward intersubjective attunement with the children, and we expected the children's responses to give us some insight into whether and how intersubjective attunement was playing out for them. We found that nearly all of the taps in these data fell into one of the following two categories:

1. **Demonstrative taps:** Serve to draw the child’s attention to an action or entity in the immediate environment.
2. **Meta-channel taps:** A subset of demonstrative taps that draw attention to a particular part of the child’s body, used to instruct children how to use their bodies to create tactile channels that link them to others and to their environment. These taps differ from demonstrative taps as they are meta-linguistic and teach the child about the appropriateness of articulator use.

Statistical analyses. For the following analyses, linear mixed-effects models (GLMMs) using the *lme4* package (Bates et al. 2015) were run. To account for non-independence, subjects were used as crossed random effects. For model selection, the models were evaluated with likelihood ratio tests, which compare the full model (e.g., including the fixed effect of interest, such as “Tap Type”) with a null model (e.g., excluding the fixed effect of interest or interaction term). If the full model vs. null model comparison reached significance, then the term of interest must have been a significant contributor to the model. The statistics are reported as the Chi-squared value and *p*-value reflecting the results of the likelihood ratio tests.

Adult’s tapping input. Demonstrative and meta-channel taps were pervasive in the child’s input (see Figure 2 for an example of tapping). The adult produced a total of 299 taps for Ana and 274 taps for Jad over the duration of the study. In particular, meta-channel taps were consistently produced more than demonstrative taps (Figure 3; model comparisons with and without the main effect of tap type, $X^2(1) = 23.89$, $p < 0.005$), even though demonstrative taps are more typical and highly frequent in adult Protactile conversations (65.21% taps for Ana and 78.88% for Jad were categorized as meta-channel; see Figure 3). We also analyzed whether the distribution of these taps changed over time (from Visits 1 to 6; see Figure 3), and contrary to our expectations, did not find a significant change in either type of tap over time (model comparisons with and without the fixed effect of time, $X^2(5) = 7.77$, $p = 0.17$.) We predicted that demonstrative taps would increase over time, while meta-channel taps would decrease over time—based on this prediction, the child would show an increased understanding of how to use their articulators for PT communication and thus would need less prompting via meta-channel taps. However, based on the current data with reduced demonstrative tap input relative to meta-channel tap input, as well as their responses (see Figures 4 and 5 below), the children did not appear to converge with Jelica on the referents that underlie demonstrative taps. They may not be at the point where they are able to understand the deictic references. As indicated by the high rates of meta-channel taps throughout, these children are also still learning how to use their articulators for Protactile communication and culturally specific conventions of exploring the environment.



Figure 2. Illustration of an interaction between Jelica and Jad. Jad is a toddler-sized boy. He has straight brown hair and is sitting in an adult’s lap (third author), facing Jelica. Jad is attempting to swipe a box toy off a tray with one hand, while Jelica taps on his other arm to affirm and encourage him (video source: Jan 25th visit).

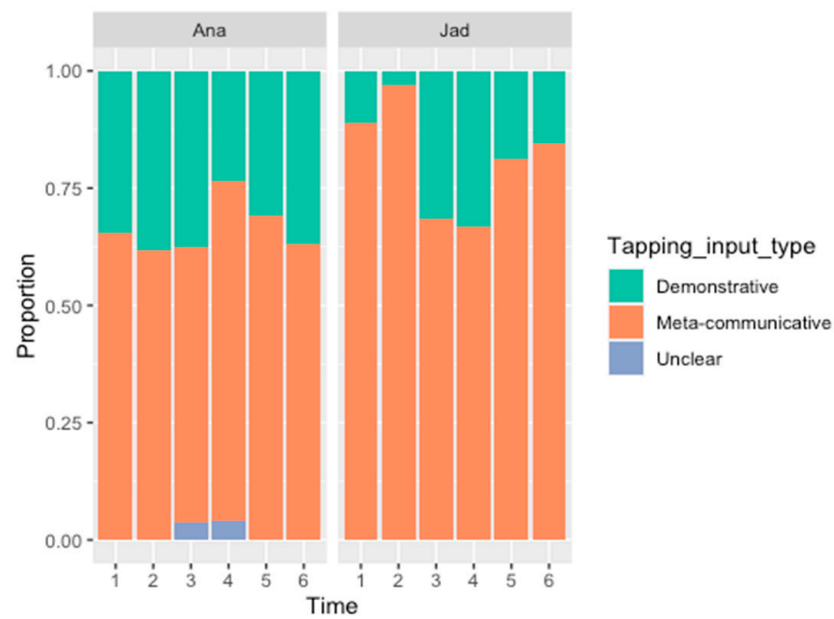


Figure 3. Proportion of the DeafBlind adult’s Protactile meta-channel and demonstrative tapping over six visits. The left plot represents Ana’s input, and the right plot Jad’s input. The green bars represent the proportion of demonstrative taps over time, the orange bars represent meta-communicative taps over time, and the purple bars indicate an unclear function of the taps. Meta-channel taps are more frequent and prevalent than the demonstrative taps in the children’s inputs.

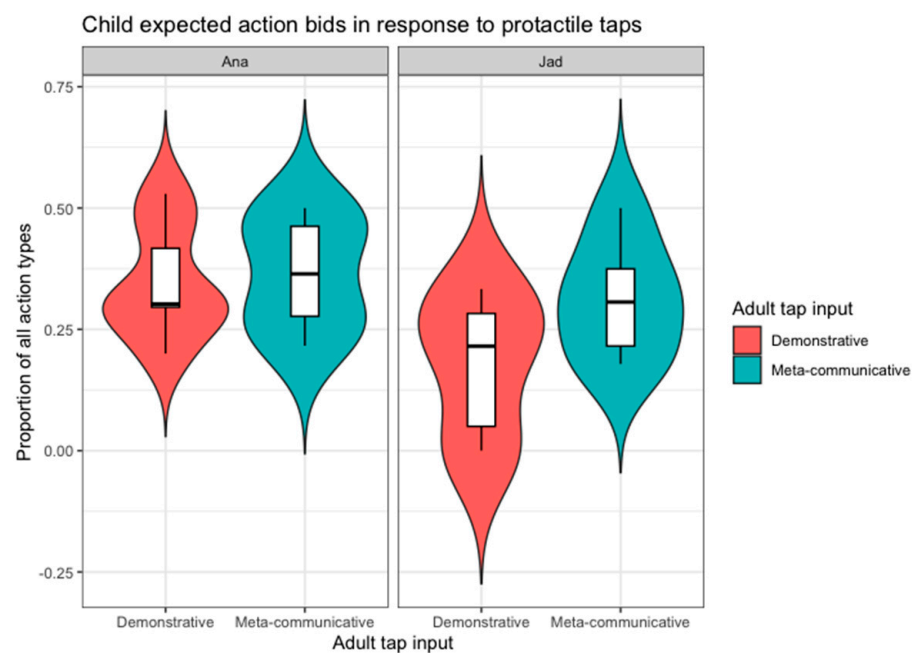


Figure 4. Violin plots exhibiting the mean proportion of child’s expected actions in turn-taking bids in the interaction over time in response to the adult’s meta-channel taps (blue) and demonstrative taps (pink). The left plot represents Ana’s behaviors, and the right plot Jad’s. Generally, they are responding more appropriately with “expected actions” to the meta-communicative taps (blue) than the demonstrative taps (pink). Other responses are not included in the visualization (unexpected action, breaks contact, no bids, or unclear). All responses across the six visits are represented in the data.

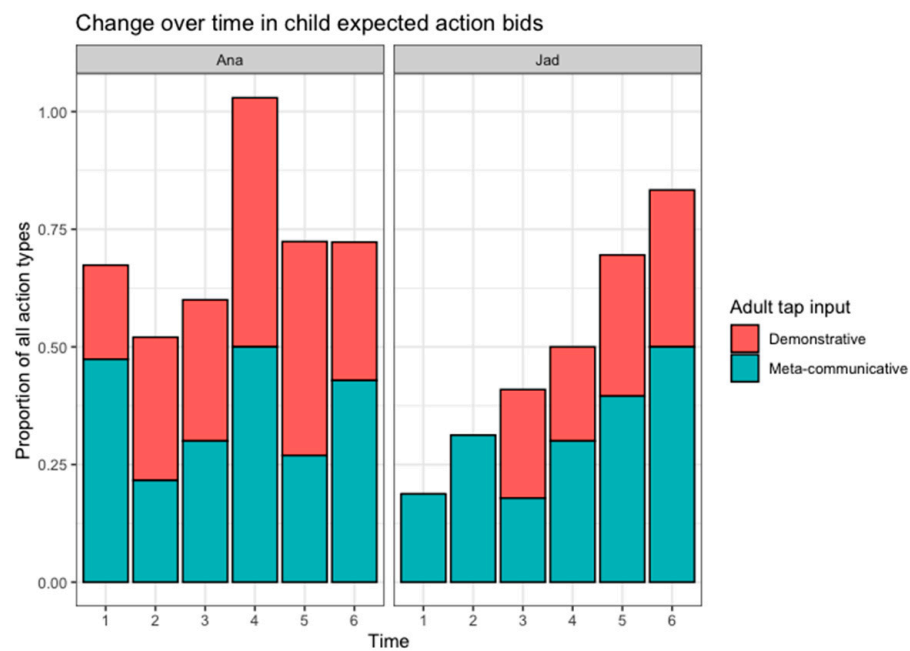


Figure 5. Distribution of child’s expected actions in response to Jelica’s taps over the six visits. The left plot represents Ana’s behaviors, and the right plot Jad’s. The denominator is the total number of bid types for that particular time point (demonstrative and meta-communicative proportions are calculated separately).

Child’s bids in response to adult’s taps. In order to analyze the child’s responses to these taps, we began by asking whether the child interacted with the adult’s taps by producing a turn-taking bid. There could be several “bids” within one communicative event, and they were categorized as such:

1. **Expected action:** The child produces an action that aligns with the adult’s request or action.
 1. *Meta-channel Tapping*—Child produces a meta-channel tap within the larger sequence of taps, imitating the adult’s meta-channel tapping.
 2. *Demonstrative Tapping*—Child produces a demonstrative tap within the larger sequence of taps.
 3. *Any other target actions*—If the child produces an action that the adult is trying to elicit, this would be coded as a target action.
2. **Unexpected Action:** When the child produces an irrelevant, unexpected action that does not correspond with the adult’s request or action.
3. **Breaks contact:** Whenever the child breaks tactile contact from the adult.
4. **No bids:** At times, the child does not tap or produce an action in the interaction sequence. The absence of bids does not mean that the child is not uptaking the information from the adult, but there is no behavioral evidence that they are. During these periods, they are still in contact with the adult, which means they could be attuning and listening to the adult.
5. **Unclear:** Whenever the child’s response was unclear, we categorized this as *unclear*.

We found that both children were overall more responsive to meta-channel taps than demonstrative taps over time in terms of production (represented in blue in the violin plot, Figure 4). Figure 4 shows that the children were overall producing fewer “expected actions” in response to demonstrative taps, which means that their understanding of demonstrative reference might still be developing. The effect was stronger for Jad (in understanding meta-channel taps as opposed to demonstrative taps) than for Ana. Figure 5 is a different visualization of the same data but shows the distributions of “expected action” bids in response to meta-channel and demonstrative taps over time. Both children

generally showed an increase in “expected” responses to meta-channel taps over time. These expected responses serve as proxies for understanding, but it is still unclear whether the child is understanding and interpreting these taps appropriately.

5. Summary

In this study, we analyzed interactions between a DeafBlind member of the research team, who is an experienced PT educator, and DeafBlind children who had no prior exposure to Protactile language or communication practices. These children were exposed to spoken languages, and one child was exposed to ASL. We focused on how the adult and child became more attuned to one another over four months and what linguistic resources were drawn on in doing so. Duranti and La Mattina’s first three properties of intersubjective attunement can be applied to this observed process: (1) sensorial access, (2) distributed intentionality, and (3) fluctuations of attention. First, Jelica worked against sighted sensibilities regarding safety to uncover an environment that could be perceived through touch and that offered trajectories for action and co-engagement. From there, she tried to understand, over the course of long stretches of interaction, how each child was responding to their environment, what they were attending to, and how they were learning. She then persistently but gently encouraged them to explore their environment in ways that were perceptible and expected among Protactile adults. She did this by adapting and re-purposing PT taps and using frequent meta-channel taps, showing children, in the flow of interaction, how to create channels that link them to others and to the world. The children’s responses to the taps showed that during this study period, they were following Jelica’s lead, beginning to build tactile channels linking them to the world and other tactile people.

6. Discussion

Many theories regarding intersubjective engagement include “sensorial access” as a foundational aspect, “level”, or “layer.” For example, Sidnell (2014) presents intersubjectivity as a layered construct. Each layer corresponds to a behavior, and underneath the behaviors there is an architecture that makes those behaviors possible. Particular behaviors vary across groups but the architecture itself is taken to be universal and human-specific. The first layer is expressed in behaviors that achieve “contact”, or the “phatic” function of communication (Jakobson 1960). An example would be maintaining eye contact with another person, such that both participants have “sensorial access” to one another (Duranti and La Mattina 2022).

In this article, we have shown that Jelica and the children had to be within tactile reach of one another (as well as the objects they were jointly attending to) to achieve sensorial access. However, there was a complex relationship for Jelica between managing tactile access, or the basic problem of “contact”, and the overall sense of being oriented in an environment. She was not only concerned with what she could “access” through touch, but more so with having a sense of where she was, where she could go, and what she could do with the children. This is a problem that has been theorized by DeafBlind Protactile theorists. For example, according to Granda and Nuccio (2018), there is a special kind of intersubjective failure that is not due to any kind of mishap in processes of intention attribution, drifting states of attention, or perception, per se, but rather a problem with “contact space.” An intelligible environment—or contact space—is a necessary requirement for registering any mishaps in communication as well as successful communication.

In Protactile theory, contact space is a theoretical construct meant to capture historically and culturally specific parameters of intelligibility. For example, if the hand of the listener goes limp in routine Protactile interaction, then the speaker will take this as a glitch—maybe a lapse in attention, a sign of boredom, or trouble understanding—and then the speaker will adjust their messages accordingly. In contrast, signs that are operable in “air space” may not count as a sign at all in contact space. For example, boredom might be expressed

by a slow glaze coming over the eyes, but eye glaze does not count as a sign in contact space. [Granda and Nuccio \(2018, p. 6\)](#) explain:

If your hand goes limp on the leg of the person you are talking to, that expresses the feeling of being tired or disinterested like a yawn does for sighted people. If someone is talking to you about something scary, you can grip their legs to express heightened attention [. . .] [Either one] is fine, but whichever you choose, be sure to use contact space, not air space.

Because the interlocuters are in contact space, signs of boredom can be registered. Contact space is also where other forms of communicative actions take place, including description, demonstration, depiction, backchanneling, and direction-giving. There are many ways to engage in these activities, but if they do not unfold in contact space, then they will not accrue meaning. You cannot give directions to a place that is not there to be discovered, or via pathways that cannot be followed. You also cannot begin to communicate in the first place unless the environment supports physical contact between participants, such as particular seating arrangements, landmarks, pathways, and other structures. In this article, we have documented the process of establishing contact space in a conventionally Protactile way with DeafBlind children. This goes beyond mere contact, as we have shown, and complicates our understanding of “sensory access” in theories of intersubjective attunement.

In addition, understanding how Jelica laid the groundwork for intersubjective attunement has implications for early intervention programs and preschools, where DeafBlind children receive services or attend school. First, there is no “technique”, “tool”, or list of vocabulary items that can generate the kind of intersubjective attunement Jelica was working toward. The starting point is, instead, finding an environment that is interpretable for the adult and the child as they co-engage in routine activities such as playing with toys, eating, or navigating from one location to another. This was not accomplished by giving them toys or objects that have an interesting texture or teaching them pre-set symbols that must be learned by memorizing conventional associations between an object and a communication act. Instead, the process began with removing obstacles that would prevent the children from exploring their environment. In Jelica’s case, this meant negotiating common sense ideas about child safety with the parents, whose homes she was a guest in. Once this was done, she was able to observe subtle cues that gave her insights into what the child was attending to, where they were interested in going, and what they were preoccupied by. She then worked with the children’s tendencies and curiosities and gently encouraged them to use their bodies in conventional Protactile ways. This laid a foundation for jointly exploring and attending to objects in the immediate environment. For example, Jelica gently encouraged Ana to use her hands, rather than her mouth, to explore. This allowed Jelica to follow Ana’s hands to objects of attention and begin to attune to her actions, curiosities, emotions, and overall responsiveness to her environment.

Similar processes of intersubjective attunement and linguistic innovations have been documented in situations of Deaf sign language users encountering each other for the first time without a shared sign language ([Byun et al. 2018](#)). However, these signers, despite coming from different countries and language backgrounds, were not trying to establish a meaningful environment that would reveal possibilities for coordinated action. For example, they may already share intuitions about where and how they could sit together to facilitate communication. The furniture and other aspects of the physical environment may not throw out obstacles at every turn since the environment is more likely to anticipate visual modes of attunement. Our analyses reveal that specific environmental conditions are critical for the possibility of intersubjective attunement, a fact that is easier to take for granted in visual and auditory environments.

Theoretically, a shift from “sensory access” to the “meaningful environment” foregrounds what [Edwards \(2024b\)](#) calls “the medium” of intersubjectivity.⁶ The medium of intersubjectivity is *the thing that we are in when we are together*. As a construct, it accounts not only for “sensory access”, but for how parameters of intelligibility for meaningful action are established in the first place. In this article, we have shown that *the medium*, more than mere

sensory access, grounds processes of intersubjective attunement. Furthermore, our theory has implications for understanding the interactional aspect of language development and emergence.

As an intersubjective medium took shape, attunement within it led to more conventional ways of representing experiences, things, and events that were common to both participants. For example, a few new Protactile lexical words cropped up during these interactions: a word for eating based on the specific way a particular child eats, or words for things like “mother” and “father” that Jelica felt would be easy for the children to perceive and possibly produce. Given Jelica’s knowledge of and intuition for Protactile language, these novel forms, unsurprisingly, adhere to Protactile grammatical constraints (Edwards and Brentari 2020, 2021), but they also seem to push the language in a more tactile direction. The linguistic outcomes of intersubjective attunement are a subject for future research; however, one can begin to see the effects of Jelica’s approach on the continued emergence of PT language with the various forms and functions of taps.

Jelica’s work suggests some promising directions in creating effective environments for young DeafBlind children to live, learn, and innovate. However, sighted people do not have the “tactile scope” (Clark 2024) necessary to adopt and build on Jelica’s approach. DeafBlind teachers are sorely missing in the landscape of DeafBlind education. According to the Lighthouse for the Blind, the unemployment rate in 2023 for DeafBlind people in the U.S. was over 80%.⁷ Finding ways to train and hire DeafBlind adults who have experience with PT would be a necessary step in applying the findings of this research to education. We also learn from research on the history of PT (Edwards 2024a) that DeafBlind teachers need to gain institutional authority to make decisions about how the environment would be structured, what would count as safe, and what kinds of activities might be effective and appropriate for DeafBlind children. Among DeafBlind adults, Protactile language and communication practices did not begin to emerge until DeafBlind people who had cultivated tactile sensibilities held positions of institutional authority, which could be leveraged to create a political frame. Indeed, PT is a set of ethical commitments, a set of principles to guide effective communication, and a language that has been shaped by both, but PT would not have emerged if it were not *also* a full-scale socio-political movement.

On this topic, Granda and Nuccio (2018) explain that, as leaders of the Protactile movement, they did not impose particular rules or conventions on members of their community. Instead, the movement was based on the idea that DeafBlind people needed space away from sighted norms, where experimentation could play out without intervention. Explaining how the movement started, they wrote (p. 3):

We pointed out to DeafBlind people that their intuitions were more right than they realized, and we encouraged that in them. We tried to give them permission as the Director and the Education Coordinator of DBSC [DeafBlind Service Center]. Then we named things that we and other DeafBlind people were doing and created a political discourse so that people had a way of talking about it and fighting for it (Granda and Nuccio 2018, p. 3)

Discovering shared intuitions for how a tactile environment might be uncovered was a process that unfolded over years of interacting, innovating, failing, and finding ways to get back on track. In the project we have reported on here, Jelica invited DeafBlind children into that process. If the history of adult DeafBlind communities is any indication, then the continuation of this process will require that DeafBlind educators be invited into educational institutions and be given the authority to negotiate obstacles that come along with sighted sensibilities about how communication can and cannot be structured, what kinds of interactions are considered appropriate and effective, and what feels safe. If DeafBlind children are gravitating to the perimeter, then the perimeter must be available to them. If our learning from this research could be reduced to just one thing, it is this: Where the clutter is cleared away and contact space is revealed, DeafBlind children will begin to expand their knowledge of the world and the people who surround them.

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Institutional Review Board Statement: This study was approved by the IRB at Saint Louis University (IRB # 31273) with additional approved IRB reliances by University of Chicago and University of California, Berkeley.

Informed Consent Statement: Informed consent was obtained from families involved in the study.

Data Availability Statement: Protecting the confidentiality of participants, data is not publicly available.

Conflicts of Interest: The authors declare no conflict of interest.

Notes

- ¹ This project, which was funded by the National Science Foundation (BCS-2038042), also created a website to support parent’s learning of Protactile language and communication practices (<https://www.deafblindkids.org/>) (accessed on 1 June 2024). This site is freely available to the public.
- ² Jelica is also second author of this article.
- ³ (3;3 and 3;5). Prior to the pandemic, one child attended a school where both English and Spanish were spoken and another child attended a school where ASL and English were spoken. One of the children lives in a household where Russian is spoken. Both children are White. Apparent perceptual capacities and orientations were different for each child, however, we did not collect medical information as part of this study. Because of small numbers, and considerable differences across participants, we report quantitative findings as individual case studies.
- ⁴ For coding the video data, we randomly selected 6 sessions for each participant (Jad and Ana) and sampled 10 min of video data from each session, so the data points represent a total of 60 min of video data for each child.
- ⁵ In order to mitigate visual bias as best we could, we cross-referenced our analyses with Jelica’s field notes and also checked analyses through a method created by Jelica and the third author called “Protactile enactment”. This method involves acting out sequences of interaction in the video data and discussing Jelica’s responses to it, and memories of her responses at the time. This is a novel method rooted in DeafBlind theatre and arts, and one that has potential uses in studying any interaction where touch plays an important role, whether Hearing, Deaf, or DeafBlind (e.g., parent–child interactions).
- ⁶ See Edwards 2024b for a more detailed discussion of the theoretical foundations of this intervention. Briefly, Edwards (2024b) reads Protactile theory through the lens of ecological psychology and existential phenomenology, contributing to our understandings of intersubjectivity by foregrounding the environment.
- ⁷ <https://lhblind.org/increasing-access-and-opportunity-national-disability-employment-awareness-month/> (accessed on 1 June 2024).

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