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AAC Technology, Autism, and the Empathic Turn

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ABSTRACT

Augmentative and Alternative Communication Technology [AAC Tech] is a relatively young, multidisciplinary field aimed at developing technologies for people who are unable to use their natural speaking voice due to congenital or acquired disability. In this paper, we take a look at the role of AAC Tech in promoting an 'empathic turn' in the perception of non-speaking autistic persons. By the empathic turn we mean the turn *towards* a recognition of non-speaking autistic people *as persons* whose ways of engaging the world and expressing themselves are indicative of psychologically rich and intrinsically meaningful experiential lives. We first identify two ways in which AAC Tech contributes positively to this development. We then discuss how AAC Tech can simultaneously undermine genuine empathic communication between autistic persons and typically developed communicators (or neurotypicals). To mitigate this concern, we suggest the AAC field should incorporate philosophical insights from *Design for Emotions* and *enactive embodied cognitive science* into its R&D practices. To make our proposal concrete, we home in on *stimming* as an autistic form of bodily expressivity that can play an important role in empathic communicative exchanges between autistic persons and neurotypicals and that could be facilitated in AAC Tech designed for autistic people.

KEYWORDS

AAC technology; autism; empathy; Design for Emotions; participatory sense-making

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Augmentative and Alternative Communication Technology, or AAC Tech, is a relatively young, multidisciplinary field aimed at developing technologies for people who are unable to use their natural speaking voice due to congenital or acquired disability. Although the AAC field both assumes and raises a rich array of metaphysical, ethical, and political questions concerning the nature, scope, and normativity of communication; the mind; empathy and other key concepts typically of interest to philosophers, relatively few philosophers have taken note of AAC Tech.[1] Likewise, the AAC field itself, though emphatically multidisciplinary, has incorporated little to no explicit philosophical reflection into its R&D and assessment practices. There is, in other words, a missed opportunity for these two disciplines to learn from each other. The underlying aim of our paper is to rectify this.

More immediately, though, we are interested in how the AAC field can play (and has played) an important, though under-examined, role in altering the way in which non-speaking persons on the autism spectrum are perceived, both at individual and societal levels (from hereon we will drop the term 'non-speaking' and simply use 'autism').[2] AAC Tech has contributed to what we call *the empathic turn* in the perception of autistic persons, by which we mean the turn *towards* the

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recognition of autistic people *as persons* who occupy an intrinsically valuable meaningful lived perspective onto the world.[3] This empathic turn signifies a turn *away* from the still influential but waning externalist view of autistic persons as 'broken beings in need of repair' (Anderson 2013, 126); beings whose lives are thought to be outwardly marked by 'stereotyped or repetitive motor movements' and inwardly marked by a lack of emotional depth, introspection, and empathy (Kapp, Steward, and Crane 2019). After a general introduction to AAC Tech in section 1, section 2 articulates two levels at which AAC Tech disrupts this externalist view of autistic persons by promoting an empathic turn. Firstly, it has played an important role in giving a voice to those members of the autism community who, without technological mediation, would not be able to give expression to their rich inner lives in a neurotypically-accessible manner. This has allowed for an increase in neurotypicals appreciating the meaningfulness of autistic ways of experiencing the world. Secondly, the process of AAC Tech assessment, which is a process of determining '*how* AAC interventions and supports can best be applied *to a given individual*,' is unequivocally directed at understanding the particular lived perspective of an individual (Mirenda 2009, 10, our italics). As such, one can understand AAC assessment itself as an empathic process.

But although AAC Tech helps disrupt the externalist view of autistic persons by challenging assumptions about the nature and scope of empathy, autistic mindedness, and mindedness more generally along the way, we argue in section 3 that AAC Tech also harbours the danger of forcing autistic people to assimilate to neurotypical norms of communication and self-expression. When this is the case, AAC Tech sets up a communicative space in which only one side of the communicative dyad can give authentic expression to their lived perspective, thus thwarting what we term *genuine empathy* in which we open ourselves to the unique perspective of another person. We argue that in order to tackle this worry and take full ownership of its empathy-promoting promise, the AAC field can benefit from philosophical research. Specifically, as we discuss in sections 4.1 and 4.2, AAC Tech can make fruitful use of insights from philosophy of technology, particularly *Design for Values* (Van Den Hoven, Vermaas, and Van De Poel 2015) and *Design for Emotions* (Desmet and Roeser 2015) and embodied cognitive science, particularly the *enactive* approach to social cognition, which foregrounds the embodied, situated, participatory way in which we succeed (or fail to succeed) at making sense of others as expressive minded beings with thick psychological lives of their own (De Jaegher and Di Paolo 2007; Reddy 2008; Gallagher 2008; Van Grunsven 2018). From section 2 onward, the expressive communicative significance of stimming will be foregrounded as we work towards our proposal for an *enactive embodied value-sensitive approach* to AAC Tech design for autistic persons.

A final note before we round up this introduction and turn to a general sketch of the AAC Tech field: while the last two sections of our paper focus on the significance of philosophical research for the AAC Tech field, the potential cuts both ways. Philosophical accounts of empathy and of the mind need to take note of the insights enabled by the AAC Tech field and the autistic persons who use AAC Tech to invite us into their experiential points of view. The ability for AAC Tech to mediate empathy and widen its scope seems to put pressure on accounts of empathy that treat it as an essentially biased emotion that only reverberates in dyadic in-group relationships (Cf. Prinz 2011). Instead, AAC Tech can help us to rethink empathy as a capacity for relating to others who have genuinely different experiences of the world; especially when AAC Tech is designed so as to operationalize the values and needs of its stakeholders and when it aims to facilitate spaces of *participatory sense-making*, to use an enactive term we home in on towards the end of the paper. Now, let us begin with a general introduction to AAC Tech.

1. AAC Tech: A Brief Introduction

Before sitting down to read this article, you probably already engaged in a wide range of communicative exchanges with the people around you. In context-appropriate ways, you may have greeted a friend ('Hey, what's up!') or a senior colleague ('Good morning') and then, transitioned into a brief

period of small talk ('how awful the weather is, *again*!'). If time permitted, you may then have shifted effortlessly into more in-depth narrative exchanges ('What did you think of last night's presidential debate?'; 'Has your father recovered from his pneumonia?'). All the while, you will have adjusted your facial expressions and the timing of your responses to match the content of the conversation. When the conversation ran its course, you will have likely subtly excused yourself ('Ugh, my next meeting is waiting for me,' or 'Well, it was great to see you again . . . '). These exchanges, even when seemingly superficial, express a mutual understanding of the other as a person whose lived perspective onto the world is worth engaging with through dialogical exchange.

Communicative exchanges like the one just sketched are so mundane and entrenched in our daily lives that their significance in enacting and sustaining moments of empathic recognition and inclusion is easily overlooked. But for some people, these exchanges are far from readily available. It is estimated that roughly 1.3% of the world's population will at some point in life lack the ability to use natural speech due to congenital or acquired disabilities such as autism; Rett syndrome; cerebral palsy; ALS; or stroke-caused paralysis. The field of AAC Tech aims at developing technologies that support the complex communication needs of its extremely varied group of stakeholders. In this section, we will give a general sketch of the field of AAC Tech and the ways in which it both supports and undermines empathic relations between different AAC users and the 'typical speakers' with whom they interact. In the following sections, we home in more specifically on AAC in the autism context.

AAC Tech is an umbrella term for a wide range of low and high-tech artefacts, ranging from pen and paper or picture boards (low-tech) to speech generating devices; mobile technologies such as smart phones and tablets with speech supporting apps; or eye tracking and gaze interaction technology.[4] AAC Tech can play a crucial role in the lives of non-speaking people, enabling access to employment, lowering exposure to physical and sexual violence, and promoting social connectedness and overall mental and physical health (Beukelman and Mirenda 2013). It also affects how non-speaking persons are perceived in social space.[5] In the words of disability rights activist, AAC user, and AAC co-developer William B Michaels, the outward articulation of his thoughts to others allows him to 'demonstrate I am not the blob incarnate' (2012). Not surprisingly, then, AAC Tech is widely heralded as a crucially important emancipatory resource within the disability activism community.

At the same time, it would be a one-sided representation of the facts to consider AAC Tech as unambiguously capable of making its users visible in social space. Colin Portnuff, who lost access to his natural speaking voice due to ALS, describes how

> if I am alone, the general assumption is that I am deaf or retarded, or both. If I have my laptop on my lap, assumptions change. It seems to act as a badge of authority, somehow creating a bridge of normality, at least until I use it to speak. Then the usual reaction is bewilderment. Just when they thought they could relate to me because they use laptops too, I start using it as a speech generating system and all bets are off (2006).

Portnuff's experience is echoed by a participant in a recent community based participatory research study on the communicative challenges faced by autistic persons in health care settings:

> I have used my Alphasmart [portable communication device] when my speech is too slow or difficult to understand for medical appointments. Some of the doctors have been really great, but others have acted really condescending when I used it, also immediately assuming I couldn't be alone (Nicolaidis et al. 2015).[6]

These personal testimonies bring out how AAC users are frequently managing two tasks at once: engaging in AAC-mediated communication with others and convincing those others that they are worthy of the presumption of communicative competence. This dual task is complicated by the fact that the communication process itself, when AAC-mediated, comes with a host of challenges that can undermine full participation in communicative exchange as well as the recognition of one's authority as a communicator.[7] Many of the temporal, bodily, and stylistic dimensions of communication that 'typical' communicators take for granted are problematized in AAC-mediated social

interaction. Direct eye-contact is often difficult, turn-taking is slowed down significantly, and as Portnuff (2006) explains, speaking in groups is nearly impossible; the pace is too fast and though he tries to anticipate and type ahead, he feels himself receding into the background when his anticipated contribution to the exchange misses the point. To approximate the swiftness characteristic of most everyday exchanges, many AAC devices come with a functionality that provides users with ready-made sentences. However, these are also generic, thus confronting users with a trade-off between expressive depth and appropriate timing. Speech generating devices also confront users with stylistic limitations: 'I wanna be able to sound sensitive or arrogant, assertive or humble, angry or happy, sarcastic or sincere, matter of fact or suggestive and sexy' (Portnuff 2006). The ability to introduce such stylistic nuance into one's communicative interactions is not only crucial for full self-expression; it also shapes one's perceived authenticity as a speaker. Portnuff wonders if 'typical' communicators can really look past the homogeneity of an AAC user's voice and detect the person's uniqueness.[8]

Ultimately, the challenge is to settle on a device that is most compatible with a user's current *and* anticipated future communication needs – needs that are in constant flux due to developmental, contextual and often also medical changes. In taking up this challenge, aspects typically considered are: the user's current and expected future sensorimotor and linguistic skills, specifics regarding their educational and family settings, and salient occurrences in their experiential lives. This in turn will determine choices about the device at the level of form (e.g. interface and symbol design) and content (what symbols are programmed and updated in the device). An adult with a speaking history who is increasingly losing access to their linguistic arsenal (e.g. due to ALS or a stroke) will have very different communication needs than an autistic child who is using AAC to enter the space of linguistic and pictorial communication.[9] To anticipate our discussion in section 3, we believe it is key to ask the question what it might mean for that autistic child (and autistic AAC users more broadly) if the expressive resources available to her follow emphatically neurotypical communication-norms. What does it mean to be initiated into a space of communication with resources that may be profoundly out of sync with one's ways of experiencing and engaging with the world?

2. AAC Tech and the Empathic Turn

The clinical approach to autism that was commonplace until recently and that continues to hold a prominent position in contemporary autism research is the Theory of Mind-Deficit view [ToMD hereafter] (Cf. Van Grunsven 2020).[10] According to the ToMD view, autistic persons either lack or possess a profoundly deficient *Theory of Mind* (Cf. Baron-Cohen 1995; Frith and Happe 1999). Crudely put, a Theory of Mind connotes a modular mechanism in the mind/brain that enables human beings to understand their own behavior and the behavior of others as caused by inner mental states such as beliefs and desires. Because autistic people allegedly have a profoundly impoverished Theory of Mind mechanism (or lack one altogether), they have also been theorized as lacking an empathic understanding of others and introspective awareness of themselves as subjects with thick psychological lives (Cf. McGeer 2009). In the words of Walter O. Spitzer, a world-renowned epidemiologist who has frequently been consulted by US Congress as an authority on autism, autistic persons are 'a dead soul in a living body' (Silberman 2015, 431). Note how, by naturalizing 'the autistic identity' as marked by a deficient Theory of Mind and believing that autistic persons are 'as a matter of fact' 'dead souls in a living body,' our inability (or refusal) to see the often idiosyncratic bodily expressions of autistic persons as expressive of rich meaningful inner lives is not seen as a failure in empathy on our part but as a scientifically backed stance appropriately responsive to what autistic minds are allegedly like. Whereas autistic persons are thought to be lacking in their empathic capacities, neurotypicals are often thought to be skilled empaths. We reject this view and follow McGeer (2009) and Milton (2012), who have articulated the 'double empathy problem,' which states that we have as much trouble (if not more) with perceiving autistic

people as possessors of psychologically thick lives as they do with perceiving the meanings of neurotypical forms of expression.[11]

Though the ToMD view of the autistic mind is still widely endorsed, technological advances in the field of AAC Tech already began disrupting this view in the 1970s. During this time, when autistic persons were often institutionalized and viewed as 'subhuman,' experiments with chimps using different forms of low-tech AAC prompted the idea that mediated forms of communication could also be used to communicate with autistic persons (Mirenda 2009, 5). Though driven by 'a sad and distasteful logic' (Mirenda 2009, 5), the introduction of different forms of AAC Tech in the autism context contributed to an empathic turn towards autistic persons in a twofold sense.

Firstly, while clinicians have overwhelmingly endorsed a ToMD view of autism well into the 21st century, the field of AAC Tech has long recognized the importance of 'seeing people, rather than diagnostic labels . . . and ensuring that the voice of the person is heard, both directly and through others who know the person well, to evaluate present conditions and identify desirable changes' (Iacono and Caithness 2009, 25) This means involving 'the individual with ASD in the assessment and intervention process . . . whereby the individual is seen as a valued and included member of society' (Iacono and Caithness 2009, 26). We should note, though, that while traditionally the process of embedding AAC Tech into a user's life has been one of empathic engagement centred around the lived perspective of the individual and her specific current and anticipated communication needs, Janice Light and David McNaughton signal a trend away from a focus on the lived experiences of the individual towards a 'misplaced focus on the technology' itself (2013, 299). Relatedly, Beukelman and Mirenda warn that the 'manufacturers and software developers' who program 'message sets (words, phrases, and sentences) [. . .] into technology' are prone to 'make the assumption that message type is uniform for people who rely on AAC at various ages or stages in life' (2013, 18). As we will discuss in section 4, we believe this concern underscores the importance of incorporating insights from Design for Values and specifically Design for Emotions into AAC Tech research and development.

Secondly, AAC Tech-access has contributed to the empathic turn by enabling a proliferation of first personal accounts testifying to the meaningfulness of non-speaking autistic people's experiences (Cf. Baggs 2007; Baylison 2016; Loud Hands Project 2012). These testimonials have slowly contributed to a change in how the – often idiosyncratic – bodily expressions of autistic persons are empathically understood and responded to by neurotypicals, both at individual and societal levels.[12] As an example, consider the widely viewed video 'In my Language' by Mel Baggs, a non-speaking autistic blogger who invites their viewers into what they consider their *native language*. Baggs' language is characterized by an intimate bodily tactile immersion with the things that surround them: they twirl a pearl necklace in the air and move their hand through running water, while rhythmically humming and rocking their body. Initially, to a neurotypical viewer, Baggs' stimming, or 'self-stimulatory movements,' may appear so alien, so far from the spectrum of what we deem as intelligible communication, that it is tempting to brush them off as strictly pathological and non-communicative, as has been the ToMD stance (Van Grunsven 2020). But the uncomfortableness one may first experience as a neurotypical in viewing this intimate display of idiosyncratic communication quickly turns into a sense of uncomfortable guilt directed at oneself. For what the second half of Baggs video drives home are the limits of neurotypical empathy; our neurotypical failure to see the richness of Baggs' lived perspective onto the world expressed in their bodily movements responding to and bringing to life different visual, auditory and tactile patterns around them (see also Sasson et al. 2017). By employing their AAC device, Baggs educates their viewers, communicating that 'the way that I move when responding to everything around me is described as being in a world of my own, whereas if I interact with a much more limited set of responses and only react to a much more limited part of my surroundings, people claim that I am opening up to true interaction with the world' (2007). It is in virtue of the AAC-mediated translation of Baggs' native language that we are invited to recognize that although "The way that I naturally

think and respond to things looks and feels so different from standard concepts or even visualization … it is a way of thinking in its own right (2007).

A recent study co-produced by autistic self-advocates and neurotypical researchers shows that stimming serves many different purposes in the experiential lives of autistic people. In addition to Baggs' proposal to understand some forms of stimming as a form of interactive immersed *thinking*, stimming is also often expressive of a person's emotional states, where subtle bodily differences in how a person stims can convey crucially different emotional states. Stimming can thus provide important entries for communication and shared experiences (Kapp, Steward, and Crane 2019).[13] We will now raise a worry about AAC Tech that asks autistic persons to abandon their ways of (emotional) self-expression and 'ways of thinking in their own right' by having to adapt to neurotypical communication norms.

3. AAC Tech: Assuming the Normativity of Neurotypical Communication?

Earlier on in this paper we sketched a mundane scene of small talk. In drafting up this exchange, we were in fact following a model of conversation outlined and recommended for AAC implementation by Beukelman and Mirenda:

> Usually people initiate a conversation with greetings followed by a segment of small talk. Some conversations then progress to an information-sharing segment … Most conversations close with some wrap-up remarks and a final farewell. *To provide the messages needed to support conversation, it is useful to select and organize messages with this conversational contour in mind* (2013, 20–21, our italics).

While this model may serve as a useful template for promoting communication between a neurotypical AAC user and their neurotypical context, it is questionable if it helps meet the communication needs of autistic AAC users, who thrive under very different norms of communication–both at the level of form and content. Mankoff, Hayes, and Kasnitz (2010), who have actively contributed to the development of AAC Tech, warn that the field must avoid 'ableist' assumptions about what communication should look like and how it is best promoted in autistic persons: "an 'ableist' view … asserts that people with autism must be made capable of communicating like neurotypical [NT] people. This approach ignores the view that individuals with autism may actually view NTs as demanding, over-communicative, and even wasteful in their communication" (3–4). The ableist assumptions in the AAC field that Mankoff et al. warn against implicitly present autistic persons as 'broken [communicators] in need of repair.'[14] It is not uncommon to come across phrasings such as the following in the literature on autism and AAC Tech:

> [A]ided AAC can function not only to replace existing problem behaviors … but also to promote new and desired behaviors … Learners who have few conventional means to communicate their intentions … are likely to develop idiosyncratic means, some of which might be considered problematic by larger community groups. Planning proactively by offering systematic conventional means of communication may head off the development of problem behaviors, either before they start or before they become so well-established that they are difficult to replace. Critical to the success of this effort is the selection of conventional acts that have *equal or greater communicative power for the user*" (Wilkinson and Reichle 2009, 355–6, our italics).

This passage harbours a number of assumptions about the moral authority of 'larger community groups' and the desirability of 'conventional means of communication' that require critical examination. Furthermore, it assumes that idiosyncratic autistic forms of self-expression and communication can simply be replaced by conventional neurotypical ones without the generation of significant experiential loss.[15] But recall the earlier example from Mel Baggs, who uses conventional communication practices *not to replace* their natural language but to educate neurotypicals precisely about its intrinsic *irreplaceable* significance. AAC Tech must attend to the different ways in which individuals and communities can have unique communication styles and recognize that these individuals and communities can lose a part of their identity (or never fully gain it) if the technology upon which

they depend for self-expression limits them to 'conventional' communication norms and practices that are in many ways alien to them.

As autism activist Jim Sinclair powerfully captures in his seminal essay 'Don't Mourn for Us,' autistic persons are continually asked by their neurotypical environment to assimilate, to suppress and supplant their autistic experiential perspective by internalizing norms of self-expression and communication with which they are out of step. Addressing neurotypical parents of autistic children, Sinclair writes:

> [Y]ou're assuming a shared system, a shared understanding of signals and meanings, that the child in fact does not share. . . . It takes more work to communicate with someone whose native language isn't the same as yours. And autism goes deeper than language and culture; autistic people are foreigners in any society. . . . You're going to have to . . . let your child teach you a little of her language, guide you a little way into his world. . . .. it *can* be done – unless non-autistic people are far more limited than we are in their capacity to relate. We spend our entire lives doing it. Each of us who does learn to talk to you, each of us who manages to reach out and make a connection with you, is operating in alien territory, making contact with alien beings (2012a, 17–8).

Note the (sad) irony that while the ToMD view has theorized autistic persons as lacking in empathic abilities, it is often in fact us neurotypicals who have sought to relate to autistic persons not by empathizing with them but by demanding they assimilate to the 'shared system . . . of signals and meanings' we recognize as our own. Some philosophical conceptions of empathy propose that this is precisely what empathy means–the identification with another on the basis of detected similarities (Cf. Hume 2000; Prinz 2011). But the efforts of 'making contact with alien beings' by 'operating in alien territory,' as described by Sinclair, suggest that a wider and perhaps more *genuine* form of empathy, directed at the other person in her otherness as someone who occupies her own unique perspective onto a world we can nevertheless share, can be found precisely where it was allegedly wholly absent.[16] Though much philosophical ink has been spilled on empathy and autism, the ideas put forth typically revolve around the alleged lack of empathy in autistic persons.[17] We suggest, by contrast, that autistic persons may precisely exemplify a different and arguably more genuine form of empathy, which could demand a reconceptualization of our practical and philosophical understanding of empathy.

Sinclair vividly captures both the painstaking labor of communicating on terms alien to him *and* the joys of finally being able to communicate in his own language:

> I had sometimes been able to establish meaningful communication with people before, but it always involved my having to learn the other person's language and do constant laborious translating. . . . with people who shared my language, meaning flowed freely and easily. . . . I experienced . . . [a] form of natural autistic social behaviour – interactive stimming (2012b, 25).

For our current purposes, the key take-away here is that genuinely supporting the complex communication needs of autistic stakeholders requires that we explicate and critically examine the neurotypical communication norms we use as a template for AAC used by autistic persons. It requires that we take seriously the often idiosyncratic forms of communication that autistic persons present us with, both at the levels of form and content. It requires that we fully embrace the 'Alternative' in A*A*C and that we genuinely understand the Communication in AA*C* as a two-way street. Neurotypicals have as much to learn from autistic forms of communication as autistic persons from neurotypical ones, a point poignantly made by Mankoff et al.:

> The design space of assistive technologies for autism . . . can and should include technologies that involve both interlocutors in the communication process. . . .. For example, in addition to an augmentative communication device that helps autistic children to approach their peers in 'socially appropriate' ways, it could be helpful to create tools that help NT children to approach their autistic peers in 'autistically appropriate' ways (2010, 4)

Focused specifically on stimming, Kapp, Steward, and Crane (2019) similarly underscore the importance of reciprocity in promoting communication and empathic understanding between autistic persons and neurotypicals:

> Potentially, other people's imitation of their stims may … help bridge the difficulties autistic and non-autistic people share in understanding one another, which Milton (2012) terms the 'double empathy problem'. Interventions should facilitate true reciprocity that helps *non*-autistic people understand and respect stimming (2019).

These calls for true reciprocity can be incorporated into AAC development, particularly when bolstered with resources from Design for Values, with an emphasis on Design for Emotions, and enactive embodied cognitive science, or so we will now propose.

4. Approaches to AAC Research and Development

Let us begin by pointing out that there are two different developments within the AAC Field that indicate the relevance of incorporating Design for Emotions and enactivism into AAC research and development.

Firstly, there is an increased focus in the AAC field on evidence-based practices (EBP). As Mirenda (2009) argues, the integration of 'current research evidence' (11) into AAC research, design, and assessment, is particularly important when it comes to AAC Tech in the context of autism: "for professionals in the field, EBPs are guaranteed to keep us humble by making us aware of just how much we still have to learn (12).[18] EBPs, Mirenda wagers, will encourage us to 'question what we think we know about people with ASD in general and how we support those individuals whose speech does not develop to communicate through AAC in particular,' though he adds that 'it remains to be seen whether the AAC community will take up this challenge both to reconceptualize ASDs in general and to design innovative AAC interventions that push traditional boundaries' (2009, 15–6). In section 4.2, we will argue that enactive research on the nature of (social) cognition offers a compelling and useful resource for taking up precisely Mirenda's 'challenge both to reconceptualize ASDs in general and to design innovative AAC interventions that push traditional boundaries.'

Secondly, in contrast with Mirenda's vision for AAC Tech R&D we have also seen in passing that there is an increasing tendency in the AAC field towards an unbridled technological enthusiasm – a technological enthusiasm that lacks the stance of epistemic humility that Mirenda calls for and that focuses almost exclusively on technological functionalities and possibilities understood in isolation from the actual perspectives, needs and values of AAC Tech's direct stakeholders. Light and McNaughton worry that this is 'resulting in AAC technologies that are poor fits for those who use them' (2013, 301). This posture of technological enthusiasm at the expense of the needs and values of users has, in other contexts, been explicitly challenged by Design for Values and Design for Emotions. As such, we believe the research from these areas in philosophy of technology can play a powerful role in an evidence-based practices-approach to AAC Tech that aims to avoid an overemphasis on technological functionalities in themselves and places the lived perspectives of its direct stakeholders at center stage.

4.1. AAC Tech and Value Sensitive Technology Development

Design for Values (also sometimes called Value Sensitive Design) is an approach in philosophy of technology that takes a pragmatic, empirically informed, forward-looking approach to engineering ethics, asking how ethically and societally important values can be safeguarded and promoted from the early phases of technology development onward (Van Den Hoven, Vermaas, and Van De Poel 2015; Friedman et al. 2013). Design for Values is grounded in the idea that technologies are never value-neutral but in fact capable of profoundly shaping the needs, values, and possibilities for action

of its direct and indirect stakeholders. From a Design for Values perspective we can understand that how an AAC Technology is designed can have a profound effect on the degree to which a user's autonomy, sense of self and ability to connect with others are promoted or thwarted.

One objection sometimes levelled against Design for Values is that it underspecifies by what means tech development should proceed in the identification of the relevant needs and values of its direct and indirect stakeholders. At the level of reflective articulation, stakeholders may not always be able to spell out what is at stake for them. Design for Emotions has responded to this objection, placing a strong emphasis on *emotions* in the ethically relevant decision-making processes that take place in settings of technological innovation and application. Desmet and Roeser's approach to Design for Emotions (2015) emphasizes that people's emotions are often indicative of their values and that, accordingly, a value sensitive form of technology development should draw on people's emotions to unveil their values, which can then be implemented in technological design. To give a concrete example: interviews explicitly focused on wheelchair-using children's *emotional* responses to existing wheelchairs revealed that the *value* of personal autonomy was undermined by big handles (Desmet and Roeser 2015; Desmet and Dijkhuis 2003).

Even though AAC Tech development is already committed to bringing in stakeholders, there is still the worry that this happens in an insufficient way. As we just highlighted, there is a growing tendency to develop AAC Tech by focusing first and foremost on what is technologically possible, rather than on what is socio-ethically desirable. Furthermore, as discussed in section 3, AAC Tech researchers can work with problematic implicit normative assumptions about what communication 'should' look like in a manner that explicitly disregards the meanings of its direct stakeholders' emotional expressions (e.g. stimming). This underscores the need to provide an explicit methodological framework that places well-established normative-ethical methodologies at the heart of technological development and that can help AAC developers to recognize that the processes they are engaged in are intrinsically ethical.[19]

Because Design for Emotions focuses on emotions as often directly expressive of people's experiences and values, and because these expressions are often manifested in nonverbal ways, it offers a framework for acknowledging the values of non-speaking stakeholders. That said, there is a hurdle here that needs to be tackled as well. As a methodological approach to value sensitive technology development, Design for Emotions presupposes the availability and intelligibility of stakeholders' relevant emotions. Now, in many contexts this may be a fair presupposition to work with: very often we can rely on a stakeholder's verbal reports to figure out what matters to them and why (as was the case with the children whose emotional responses to existing wheelchairs were retrieved through interviews). Furthermore, when verbal reports are absent, the sadness, frustration, or joy that a given technology may evoke in its direct and indirect stakeholders may be directly 'read off' their bodily expressions. However, in the context of non-speaking autistic stakeholders, both of these resources are precisely often unavailable or misperceived in terms of their significance (recall the double-empathy problem and the neurotypical misperception of stimming). This suggests we need to expand Design for Emotions with a theory of the conditions under which nonverbally expressed emotions can be perceptually accessible or precisely misperceived. As we discuss now, an enactive approach to social cognition offers such a theory.

4.2. Autism (Participatory) Sense-Making and AAC Tech Design

Enactivism is a fast-growing research field in embodied cognitive science that draws on insights from the phenomenological tradition of Edmund Husserl and Maurice Merleau-Ponty as well as (developmental) psychology, biology, and neuroscience to explain cognition as the activity of embodied living beings (Cf. Varela, Thompson, and Rosch 1991; Di Paolo 2005; Thompson 2007; De Jaegher and Di Paolo 2007). The defining property of a living being, according to enactivists, is its *precarious autonomy*; living beings are systems that are constantly in the business of maintaining their bounded

identity through a fundamental exposure and dependency on their environment. As such, living things occupy a self-regulating perspective onto an environment that is meaningfully organized in correlation with their self-constituting activities (Thompson 2007). It is precisely because the autonomy of living beings is fundamentally precarious – because living beings are porous bodily beings, exposed and dependent on what is other and thereby situated in an environment that they perceive as meaningful in relation to their self-maintaining activities – that they are in their very being cognitive creatures.

The term *sense-making* is used to refer to cognition understood along these enactive lines (Cf. Thompson 2007). Sense-making at once captures the idea that living organisms actively enact and participate in what matters to them (they make sense or meaning) and that they are in the business of orienting themselves in the world (to cognize the world is to make sense of it). As Hanne De Jaegher (2013) has shown, this picture of cognition as precarious sense-making opens up an approach to autism that recognizes various autistic embodied behaviors frequently labelled as pathological and deficient, as in fact forms of sense-making experienced as intrinsically meaningful: 'the sensorimotor and affective aspects of autism can be seen as alternative ways of perceiving the world or also as strategies to cope with it . . . If autistic embodiment is intrinsically linked with autistic sense-making, we can hypothesize that many autistic people will find joy or significance in behaviors and embodied styles of sense-making that are considered 'autistic' (9). Echoing the first-person testimony by Mel Baggs that we encountered earlier, De Jaegher develops this idea further by highlighting the aesthetic meaning that perceptual experience can have for autistic persons:

> An often-ignored factor in perception is the aesthetic element. . . .. Rich patterns exist everywhere in the world, and many autistic people value them, care about them, even enjoy them. . . . People with autism . . . may feel that they will lose something salient if they (are made to) try to [ignore these patterns] (2013, 9).

De Jaegher's account thus calls into question the assumption we saw earlier, that autistic forms of self-expression and communication can simply be replaced by conventional neurotypical ones without the generation of significant experiential loss. De Jaegher's account, indeed the enactive approach to cognition as sense-making more generally, also encourages us to adopt a stance of epistemic humility when it comes to making sense of the expressive behavior of others (as such, this aligns with Mirenda's earlier call for epistemic humility). Whereas the ToMD approach to autism dismisses the communicative significance of autistic stereotyped behavior offhand, an enactive approach encourages us to situate and make sense of a living being's behavior within their wider project of maintaining their precarious autonomy through a constant negotiation with their environment. A living being's expressions are, more likely than not, expressive of a world mattering to them in a particular way. This approach to cognition, which 'brings a dimension of personal significance right to the core of cognition,' can serve as a theoretical baseline or reminder for AAC researchers and developers, encouraging them to exhibit a readiness to take behaviors that they might not immediately recognize as communicative as indicative of how a stakeholder feels about and values their technology (De Jaegher 2013, 1). Of course, this readiness by itself, though important, won't get us very far in terms of research and design recommendations. Those working in the AAC Tech space who accept that we need to take seriously the cognitive significance of an individual's particular embodied expressions – even if they look idiosyncratic, stereotypical, opaque, non-communicative – likely want further resources on how to bring in view the lives of others who sometimes express themselves in ways that are not immediately intelligible to many of us. In other words, how does a readiness to conceive of, say, stimming, as communicative and expressive of an autistic person's lived perspective onto the world translate into an actual sharing of worlds and perspectives? To offer a tentative answer to this question and indicate how this might affect AAC Tech design, we will now take a closer look at the enactive approach to *social* cognition.

The enactive term for social cognition is *participatory sense-making* (De Jaegher and Di Paolo 2007). Briefly put, participatory sense-making refers to the ways in which human beings enact relational domains of shared meaning through dyadic interactions, where these domains both enable and are enabled by the sense-making of the interacting individuals. Think of the musical space enacted by two musicians improvising or the fantastical space enacted by two children playing knights – what each person does is shaping and shaped by the shared space of significance that participatory sense-making enables. These dyadic interactions have a crucial but easily overlooked dimension of bodily responsiveness. Think of the role that eye contact, tone of voice, pacing, synchronicity and the rhythm of turn-taking play in promoting (or thwarting) an interaction and enabling (or foreclosing) the enactment of a shared space of meaning.

Participatory sense-making requires that both interactors are continually responsive to the other's embodied sense-making activities: 'I must alter my actions contextually in order to reencounter the other and in the process, sometimes, be encountered myself when her sense making unexpectedly modulates my own' (De Jaegher and Di Paolo 2007, 504). If this mutual embodied responsiveness disappears, if I fail to perceive and be responsive to, say, the subtle expressive significances of someone's flapping done out of excitement or flapping done out of anxiety, then participatory sense-making ceases to be precisely participatory: 'The "other" would simply become . . . an object, or a problem for . . . individual cognition' (2007, 492). Developmental psychologist Vasu Reddy, who has made significant contributions to the enactive field, goes so far as to argue that it is in processes of second-person engagement (or participatory sense-making) when we are 'actively involved with persons that we can perceive them as they are' (2008, 29). Put differently, from an enactive perspective, participatory sense-making is the soil of genuine empathy. This enactive perspective suggests that we should firstly understand failures of empathy between autistic persons and neurotypicals as resulting from mismatches *between* people's patterns, rhythms, and expectations in embodied interaction (De Jaegher 2013; Sasson et al. 2017). Note the stark contrast this sets up with ToMD, which theorizes autism primarily in terms of empathy-interfering ToM deficits that lie strictly within an autistic individual.

We suggest that AAC R&D should explicitly reflect on the vast range of bodily, rhythmic, and temporal dimensions of human communication that play such an integral role in the successes and failures of participatory sense-making. As an example of two researchers engaged in the kind of reflection we have in mind, consider the following excerpt from Van Goidsenhoven and De Schauwer (2020) who are collaborating with Heleen, a young non-speaking autistic woman to find "openings in fixed normative relations to voice and communication that all the time exclude and marginalize persons labelled as non-verbal (2020, 331). They describe how, finding these openings

> Often demanded serious adjustments of the speed I [Leni] moved and expected Heleen to move.. . . Of course, these adjustments in speed were not always comforting in an age of perspiring haste, competition, and capitalist logic. Slow inquiry allows being receptive to possibilities that lead to flourishing and emphasizes a relational ontology which holds that people . . . come into being through relationships (2020, 333).

Temporality is one of several dimensions of participatory sense-making that can be adjusted and that can open up lines of reciprocal communication if and when our neurotypical temporal expectations are thematised and reflected upon. We propose that the enactive research on participatory sense-making, with its focus on the wide range of bodily dimensions of 'intercorporeal dialogue,' can bolster efforts to operationalize reciprocal empathic communication in AAC Tech R&D (Fuchs and De Jaegher 2009). To give another brief example: a graduation project at the Industrial Design department at the University of Twente, supervised by Jelle van Dijk, whose work focuses on participatory design for and with people on the autism spectrum, is using the notions of turn-taking and participatory sense-making to develop an interactive stimming device that enables two users to build up and tap into a history of nonverbal shared sense-making.[20]

In sum, the enactive approach to autism replaces a ToMD-emphasis on communicative deficits attributed in full to the autistic individual with an emphasis on communication as an embodied relational process. This, we hope to have indicated, can have decisive implications for the design-requirements identified in AAC Tech development, where the aim moves from attempts to mitigate alleged individual communication-deficiencies to the aim of trying to facilitate shared spaces of participatory sense-making. Equally important, enactive insights on the dimensions of participatory sense-making can also bolster attempts in the AAC field to perceive and be responsive to the emotional expressions of its autistic stakeholders, thus playing an important role in a value sensitive approach to AAC development.

5. Conclusion

It is undeniably important that non-speaking autistic persons have access to and can participate in many spheres of neurotypical society. What is more, as AAC Tech makes these spheres accessible to a more diverse range of individuals, they will likely change themselves, adopting norms that are more inclusive and capable of contributing to the empathic turn. At the same time, if they are not critically examined and reflected upon throughout the R&D and assessment process, the norms and expectations characteristic of neurotypical communication practices can be taken for granted in ways that threaten the promotion of genuine empathic interactions between autistic persons and neurotypicals in a twofold sense, namely by 1) reinstating a conception of autistic persons that foregrounds their deficiencies as communicators, and by 2) setting up a communicative space in which only one side of the communicative dyad can give genuine expression to their meaningful lived perspective onto the world. What we hope to have shown here is that this concern warrants the incorporation of philosophical research from Design for Values, especially Design for Emotions, and enactivism into the AAC Tech field. This can contribute to developing AAC Tech that promotes genuine participatory sense-making in the design as well as the use of AAC Tech. It is in this way that AAC Tech can genuinely claim its role in the *empathic turn* towards a recognition of autistic persons precisely *as persons* who occupy an intrinsically valuable meaningful lived perspective onto the world.

Furthermore, AAC Tech encourages us to reassess our preconceived notions of empathy as an intrinsically biased orientation towards the other that only reverberates in dyadic in-group relationships. As such, AAC Tech poses a constructive 'disruption' of our philosophical vocabulary. This is a fascinating yet largely unexplored area of research to which this article hopes to have made a first contribution.

Notes

1. The two explicitly philosophical discussions of AAC that we have come across are by Kathy Howery (2018) and Josh Dohman (2016), with the latter discussing AAC in passing.
2. We should note that there are degrees of being 'non-speaking' and different ways in which one may incorporate an AAC device in one's daily life. Someone may be permanently non-speaking or intermittently non-speaking, where, in the latter case, there may be certain periods or situations that make using one's natural speaking voice undesirable (for instance, because it is too taxing or, perhaps, because it simply doesn't meet the way in which one wants to express oneself and respond to a situation). We want to thank an anonymous reviewer for encouraging us to make this explicit.
3. The labelling language surrounding autism is complex. We will use 'identity first' language (e.g. 'autistic people' and 'autistic persons'). This is typically the preferred label used by autistic people who argue that their autism is an integral part of their identity. Cf https://autisticadvocacy.org/about-asan/identity-first-language/
4. Though increasingly accepted as an essential resource for people with Complex Communication Needs, AAC Tech has also been seen as controversial by many clinicians and educators. One concern, which is now considered empirically false, was the worry that introducing AAC Tech into the lives of non-speaking children would stunt them in their abilities to communicate in more standard ways (Cf Millar 2009). Two forms of AAC usage that continue to be viewed with suspicion are Facilitated Communication (FC) and Rapid Prompting Method (RPM), both of which involve physical and/or emotional and/or instructional support from another

person throughout the communication process (Cf. Mirenda 2009). While many users of FC and RPM insist on the authenticity of their communicative acts (Cf. http://nonspeakingautisticspeaking.blogspot.com/); and while academics such as Douglas Biklen, who introduced FC to North America, have also defended their emancipatory potential; the American Speech Language Hearing Association (among others) has raised concerns about the scientific validity of these methods, stating that it 'should not be assumed to be the communication of the person with a disability' https://www.asha.org/policy/ps2018-00351/. We will leave these controversial debates to the side, focusing on the now more widely accepted forms of high-tech AAC that do not involve direct in-person mediation from another human person. That said, there are philosophical assumptions underpinning the distinction between 'authentic' unmediated communication and supported communication that warrant further scrutiny. As Matthew Wolf-Meyer poignantly puts it we all depend on wider support systems in our capacities as speakers: 'we are equally facilitated by those technologies which are largely invisible – language, institutions, society itself – which have been brought into being and control our experiences of self and world' (2020, 183).

5. In using 'non-speaking' we are adopting the term as it is preferred by neurodiversity activists. For a clear defense of the 'non-speaking' (as opposed to non-verbal) label and why it does a better job at acknowledging that speaking comes in degrees, see https://withasmoothroundstone.tumblr.com/post/84597394825/about-nonverbal-and-nonspeaking
6. For another powerful approach to inclusive research, involving autistic people in ethics and social science research as co-researchers see Maaike Hermsen's inaugural address https://www.han.nl/artikelen/2020/12/intrede-maaike-hermsen-wat-vinden-mensen-met-een-verstandelijke-beperking-zelf-belangrijk/#
7. There is an obvious link here between the AAC Field and the philosophical research area on Epistemic Injustice (Cf. Fricker 2007).
8. Some of these challenges can be mitigated at the level of the technology itself. For instance, most AAC devices are now able to support both word and sentence-based messaging, thus mitigating the trade-off between selecting a device that supports expressive depth or one that supports swiftness in communication. Beukelman and Mirenda (2013) also note that 'the voice output options available in modern AAC devices' have greatly improved, making the artificial voice 'intelligible and natural enough to allow AAC use in a wide range of social contexts' (20).
9. Cf Beukelman and Mirenda (2013)
10. Two other prominent theories of autism are *weak central coherence* (WCC) and *executive function* (EF). WWC sees a focus on parts and details at the expense of grasping wholes and overall context as the defining characteristic of autism. This theoretical perspective on autism signifies an important departure from ToMD. It has contributed to an appreciation of some of the remarkably detailed ways in which persons on the autism spectrum experience their environment (Cf. De Jaegher 2013; Happé and Frith 2020). While important insights from WCC (and also EF) can undoubtedly be gleamed for the purposes of AAC Tech development, we focus our discussion on ToMD because we are, in the first instance, focused on social cognition, social interaction and the promotion of reciprocal empathy; and ToMD is *the* theory of autism focused on precisely these phenomena. For a discussion of some of the pressing shortcomings of ToMD, WCC and EF, including Frith's 2003 attempt to integrate these three theories into one account see De Jaegher (2013).
11. See also Morton Ann Gernsbacher (2006), which critiques parents, scientists, and educators for failing to see how they fail to engage in genuinely reciprocal interaction with autistic persons.
12. Even Autism Speaks, the most influential autism 'activism' organization that pushed for a cure for autism and has been labelled by some autistics as a hate group, has removed any mentioning of a cure from its website.
13. We want to thank an anonymous reviewer for drawing our attention to this study.
14. We are here rephrasing the earlier citation from Anderson (2013) who criticizes the view of autistic persons as 'broken beings in need of repair.'
15. We can here see an analogy with reductive accounts of artistic expressions that attempt to translate music or visual art into linguistic, propositional meaning, thereby missing the point of what is the unique medium-specific language of music and visual art. The link between autistic forms of self-expression and aesthetic experience is made explicit below via De Jaegher's observations (2013).
16. See Roeser and Willemsen (2004) for a more detailed discussion of empathy understood in this more genuine or elevated form.
17. Notable exceptions are McGeer (2009), Hacking (2009) & Dinishak (2016)
18. Note that the notion of 'disorder' is problematic from the perspective we take in this paper.
19. This includes explicit ethical reflection to avoid that any emotions and values of people are given equal weight, as people can obviously harbour problematic values and emotions (Cf. Steinert and Roeser 2020).
20. https://people.utwente.nl/jelle.vandijk?tab = research

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References

Anderson, J. L. 2013. "A Dash of Autism." In *The Philosophy of Autism*, edited by J. L. Anderson and S. Cushing, 109–142. Plymouth: Rowman & Littlefield.

Baggs, M. 2007. "In My Language." https://www.youtube.com/watch?v=JnylM1hI2jc

Baron-Cohen, S. 1995. *Mindblindness: An Essay on Autism and Theory of Mind*. Cambridge, MA: MIT Press.

Baylison, G. 2016. *Published in the Washington Post*, May 19. https://www.washingtonpost.com/news/inspired-life/wp/2016/05/19/this-non-speaking-teen-wrote-an-incredibly-profound-letter-to-police-about-autism/?noredirect=on

Beukelman, D., and P. Mirenda. 2013. *Augmentative and Alternative Communication: Supporting Children and Adults with Complex Communication Needs*. Baltimore: Paul H Brooks.

De Jaegher, H. 2013. "Embodiment and Sense-Making in Autism." *Frontiers in Integrative Neuroscience* 7 (15): 1–19. doi:10.3389/fnint.2013.00015.

De Jaegher, H., and E. Di Paolo. 2007. "Participatory Sense-Making: An Enactive Approach to Social Cognition." *Phenomenology and the Cognitive Sciences* 6 (4): 485–507. doi:10.1007/s11097-007-9076-9.

Desmet, P. M. A., and S. Roeser. 2015. "Emotions in Design for Values." In *Handbook of Ethics, Values, and Technological Design*, edited by J. Van Den Hoven, P. E. Vermaas, and I. Van De Poel, 203–219. Springer Netherlands. doi:10.1007/978-94-007-6970-0_6.

Desmet, P. M. A., and E. A. Dijkhuis. 2003. "Wheelchairs Can Be Fun: A Case of Emotion-driven Design." Proceedings of the international conference on designing pleasurable products and interfaces. Pittsburgh/New York: ACM, June 23–26.

Di Paolo, E. 2005. "Autopoiesis, Adaptivity, Teleology, Agency." *Phenomenology and the Cognitive Sciences* 4 (4): 429–452. doi:10.1007/s11097-005-9002-y.

Dinishak, J. 2016. "Empathy, Like-mindedness, and Autism." In *Normativity and Naturalism in the Philosophy of the Social Sciences*, edited by M. Risjord, 113–134. New York: Routledge.

Dohman, J. 2016 October. "A Little of Her Language: Epistemic Injustice and Mental Disability." *Res Philosophica* 93 (4): 669–691. doi:10.11612/resphil.1475.
Fricker, M. 2007. *Epistemic Injustice: Power and the Ethics of Knowing*. Oxford: Oxford University Press.
Friedman, B., P. H. Kahn, A. Borning, and A. Huldtgren. 2013. "Value Sensitive Design and Information Systems." In *Early Engagement and New tTechnologies: Opening up the Laboratory*, edited by N. Doorn, D. Schuurbiers, I. Van De Poel, and M. E. Gorman, 55–95. Springer Netherlands. doi:10.1007/978-94-007-7844-3_4.
Frith, U., and F. Happe. 1999. "Theory of Mind and Self-consciousness: What It Is like to Be Autistic?" *Mind & Language* 14 (1): 1–22. doi:10.1111/1468-0017.00100.
Fuchs, T., and H. De Jaegher. 2009. "Enactive Intersubjectivity: Participatory Sense-making and Mutual Incorporation." *Phenomenology and the Cognitive Sciences* 8 (4): 465–486. doi:10.1007/s11097-009-9136-4.
Gallagher, S. 2008. "Inference or Interaction: Social Cognition without Precursors." *Philosophical Explorations* 11 (3): 163–174. doi:10.1080/13869790802239227.
Gernsbacher, M. A. 2006. "Toward a Behavior of Reciprocity." *The Journal of Developmental Processes* 1 (1): 139–152.
Hacking, I. 2009. "Autistic Autobiography." *Philosophical Transactions of the Royal Society B: Biological Sciences* 364 (1522): 1467–1473. doi:10.1098/rstb.2008.0329.
Happé, F. and U. Frith. 2020. "Annual Research Review: Looking Back to look Forward – Changes in the Conceptof Autism and Implications for Future Research." *The Journal of Child Psychology and Psychiatry* 61: 218–232. https://doi.org/10.1111/jcpp.13176
Howery, K. 2018. "When My Voice Is Not My Voice: Speaking through a Speech Generating Device." *Phenomenology & Practice* 12 (1): 4–17. doi:10.29173/pandpr29354.
Hume, D. 2000. *A Treatise of Human Nature*, edited by D. F. Norton and M. J. Norton. Oxford: Oxford University Press.
Iacono, T., and T. Caithness. 2009. "Assessment Issues." In *Autism Spectrum Disorders and AAC*, edited by P. Mirenda and T. Iacono, 23–50. Baltimore: Paul H Brooks.
Kapp, K. S., R. Steward, and L. Crane. 2019. "'People Should Be Allowed to Do What They Like': Autistic Adults' Views and Experiences of Stimming." *Autism* 23 (7): 1782–1792. doi:10.1177/1362361319829628.
Light, J. and D. McNaughton. 2013. "Putting People First: Re-Thinking the Role of Technology in Augmentative and Alternative Communication Intervention." *Augmentative and Alternative Communication* 29 (4): 299–309. doi:10.3109/07434618.2013.848935.
Loud Hands Project & Autistic Self Advocacy Network. 2012. *Loud Hands: Autistic People, Speaking*, edited by J. Bascom. Washington, DC: Autistic Press.
Mankoff, J., G. Hayes, and D. Kasnitz. 2010. "Disability Studies as a Source of Critical Inquiry for the Field of Assistive Technology." Proceedings of the 12th International ACM SIGACCESS Conference on Computers and Accessibility, ASSETS 2010, Orlando, FL, October 25–27.
McGeer, V. 2009. "The Thought and Talk of Individuals with Autism: Reflections on Ian Hacking." *Metaphilosophy* 40 (3–4): 517–530. doi:10.1111/j.1467-9973.2009.01601.x.
Millar, D. C. 2009. "Effects of AAC on the Natural Speech Development of Individuals with Autism Spectrum Disorders." In *Autism Spectrum Disorders and AAC*, edited by P. Mirenda and T. Iacono, 171–192. Baltimore: Paul H Brooks.
Milton, D. E. 2012. "On the Ontological Status of Autism: The 'Double Empathy Problem'." *Disability & Society* 27: 883–887. doi:10.1080/09687599.2012.710008.
Mirenda, P. 2009. "Introduction to AAC for Individuals with Autism Spectrum Disorders." In *Autism Spectrum Disorders and AAC*, edited by P. Mirenda and T. Iacono, 3–22. Baltimore: Paul H Brooks.
Nicolaidis, C., D. M. Raymaker, E. Ashkenazy, K. E. McDonald, S. Dern, A. E. Baggs, S. K. Kapp, M. Weiner, and W. C. Boisclair. 2015. ""Respect the Way I Need to Communicate with You": Healthcare Experiences of Adults on the Autism Spectrum." *Autism: The International Journal of Research and Practice* 19 (7): 824–831. doi:10.1177/1362361315576221.
Portnuff, C. 2006. "AAC: A User's Perspective." *Video Lecture, presented at Oregon Health and Science University as part of the AAC-RERC Webcast series*. https://www.youtube.com/watch?v=ldXC3FbShn0
Prinz, J. 2011. "Against Empathy." *The Southern Journal of Philosophy* 49: 214–233. doi:10.1111/j.2041-6962.2011.00069.x.
Reddy, D. V. 2008. *How Infants Know Minds*. Cambridge, MA: Harvard University Press.
Roeser, S., and M. Willemsen. 2004. "Compassie en verbeelding: Over Nietzsche, Nussbaum en de onwenselijkheid van egoïsme." *Algemeen Nederlands tijdschrift voor wijsbegeerte* 96 (1): 53–65.
Sasson, N., D. Faso, J. Nugent, S. Lovel, D. P. Kennedy, and R. B. Grossman. 2017. "Neurotypical Peers are Less Willing to Interact with Those with Autism Based on Thin Slice Judgments." *Scientific Reports* 7. doi:10.1038/srep40700.
Silberman, S. 2015. *Neurotribes: The Legacy of Autism and the Future of Neuro-diversity*. New York: Avery (an imprint of Penguin Random House).
Sinclair, J. 2012b. "Autism Network International: The Development of A Community and Its Culture." In *Loud Hands: Autistic People, Speaking*, edited by J. Bascom, 22–70. Washington, DC: Autistic Press.

Sinclair, J. 2012a. "Don't Mourn for Us." *Loud Hands: Autistic People, Speaking*, edited by J. Bascom, 15–21. Washington, DC: Autistic Press.

Steinert, S., and S. Roeser. 2020. "Emotions, Values and Technology: Illuminating the Blind Spots." *Journal of Responsible Innovation* 7: 298–319. doi:10.1080/23299460.2020.1738024.

Thompson, E. 2007. *Mind in Life: Biology, Phenomenology, and the Sciences of Mind*. Cambridge, MA: Harvard (Belknap).

Van Den Hoven, J., P. E. Vermaas, and I. Van De Poel. 2015. "Design for Values: An Introduction." In *Handbook of Ethics, Values, and Technological Design*, edited by J. Van Den Hoven, P. E. Vermaas, and I. Van De Poel, 1–7. Springer Netherlands. doi:10.1007/978-94-007-6970-0_40.

Van Goidsenhoven, L., and E. De Schauwer. 2020. "Listening Beyond Words: Swinging Together." *Scandinavian Journal of Disability Research* 22 (1): 330–339. doi:10.16993/sjdr.756.

Van Grunsven, J. 2018. "Enactivism, Second-person Engagement and Personal Responsibility." *Phenomenology and the Cognive Sciences* 17: 131–156. doi:10.1007/s11097-017-9500-8.

Van Grunsven, J. 2020. "Perceiving 'Other' Minds: Autism, 4E Cognition, and the Idea of Neurodiversity." *Journal of Consciousness Studies* 27 (7–8): 115–143.

Varela, F., E. Thompson, and E. Rosch. 1991. *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge: MIT Press.

Wilkinson, K. M., and J. Reichle. 2009. "The Role of Aided AAC in Replacing Unconventional Communicative Acts with More Conventional Ones." In *Autism Spectrum Disorders and AAC*, edited by P. Mirenda and T. Iacono, 355–384. Baltimore: Paul H Brooks.

Williams, M. B. 2012. "How Far We've Come, How Far We've Got to Go: Tales from the Trenches." https://www.youtube.com/watch?v=f14uio_2tNk

Wolf-Meyer, M. 2020. "Facilitated Personhood." *The Journal of the Royal Anthropological Institute* 26: 167–186. doi:10.1111/1467-9655.13184. from another source.