CHAPTER 8

Becoming In/dependent: An Assemblage Analysis of Technical Design from Below

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Abstract: In this chapter we investigate the resistance of two tech-savvy speech and mobility impaired users to increased attempts at digitalising their communication devices. Though these informants are keen users of technology and accommodate various types to increase their ability to become independent, they are also highly critical of the technologies they are continuously confronted with. Through in-depth ethnography, we suggest a context-sensitive approach when introducing new technology, for people who are not always able to communicate and express what they mean directly. We believe that we need to be attentive to what is being introduced, as well as to what is taken away from the assemblage of speech and mobility impaired users and their technologies. In a society that is increasingly streamlining services and communication towards digital technologies, we need to be attentive to users' resistance, and how digitalisation might hinder people's ability to become independent.

Keywords: technology, disability, assemblage, design, digitalisation, feedback, cybernetics, analogue/digital

> What then is analogue communication? The answer
> is relatively simple: it is virtually all nonverbal com-
> munication. This term, however, is deceptive, because
> it is often restricted to bodily movements only, to the
> behaviour known as kinesics. We hold that the term
> must comprise posture, gesture, facial expression,
> voice inflection, the sequence, rhythm, and cadence of
> the words themselves, and any other nonverbal com-
> municational clues, unfailingly present in any context
> in which an interaction takes place.
> —Watzlawick et al., 1967, p. 62

In this chapter we investigate the circumstances of two extraordinary persons, Jon and Thomas, who are speech and mobility impaired due to cerebral palsy, and how they interact with and through a gamut of both digital and analogue technologies in their own distinct ways. Central to our argument is that the texture of communication is both digital *and* analogue. Purifying or greatly reducing one over the other in human communication can potentially influence this texture, and hence, our understanding of what is communicated. Working from a branch of language philosophy that defines communication as performative acts embedded in practice (Austin, 1975; Searle, 1969; Wittgenstein, 1997), we argue for sensibility to acts of communication, and a need to examine technologies that reduce or completely cancel the analogue dimension of human communication. When introducing new technologies into the lives of people who are speech and mobility impaired, this is perhaps especially important, as they already struggle to be heard and understood. The ethnographic fieldwork with Jon and Thomas was conducted 20 years ago (and some years after that). In our reanalysis of this material, we find ethnographic details, which have become especially interesting given the contemporary drive towards digitalisation in society. We ask: In a society where digital technologies are being introduced everywhere, how can we develop a critique that is sensitive to the fact that communication is both analogue as well as digital; and/or does transforming communication into purely digital diminish the texture of communication, and therefore its quality?

As discussed in the introductory chapter, the distinction between digital and analogue communication and technology was made by early cybernetics. In the initial days of cybernetics, a precursor to digital computers, artificial intelligence, and robotics (Pickering, 2010), Norbert Weiner

pointed out the importance of feedback processes when working to under-
stand relations and communication between living beings and machines.
Cybernetics comes from the Greek word for steersman and refers to how
he constantly needs to adjust the course of the ship in relation to chang-
ing circumstances at sea, through the flow of information being fed back
into the activity of steering the ship. Ongoing adjustments based on feed-
back processes to create stability are commonly referred to as homeostasis.
Andrew Pickering agrees with Norbert Wiener (1954) that the concept of
homeostasis is a substantial philosophical contribution to contemporary
thought (Pickering, 2002, p. 417). It also plays a central role in Gregory
Bateson's *The cybernetics of 'self': A theory of alcoholism*. In this work
Bateson criticises the Western epistemological legacy of conceptualising
the self as an autonomous, independent entity, operating in opposition to
its surroundings. The alcoholic imagining himself as 'the captain of his soul'
(Bateson, 1971, p. 441) continuously finds himself in conflict with the 'bottle',
and each attempt to conquer the alcohol eventually leads to defeat. Bateson
commends Alcoholics Anonymous' cybernetic epistemology insisting that
the alcoholic surrender to his alcoholism, rather than articulate any posi-
tion in which he can 'win' or overcome his alcoholic state. By insisting on
the 'bottle' being a continuous part of the alcoholic self, the individual
no longer needs to engage in a competitive relationship with alcohol. By
accepting himself as an alcoholic, the tension and conflict resolves, laying
the groundwork for a sober existence as an alcoholic. For Bateson, this was
part of a general critique of Western epistemology:

> If we continue to operate in terms of a Cartesian dualism of mind versus matter, we
> shall probably also continue to see the world in terms of God versus man; elite versus
> people; chosen race versus others; nation versus nation; and man versus environment.
> It is doubtful whether a species having both advanced technology and this strange
> way of looking at its world can endure. (Bateson, 1971, p. 455)

Bateson finds a misanthropic antidote in his cybernetic epistemological
systems theory, in which human existence is immanent with its surround-
ings. It is always a question of '… man plus environment' (Bateson, 1971,
p. 444). The assemblage concept of Giles Deleuze, which will be used in
this chapter, also draws inspiration from aspects of Gregory Bateson (Bell,
2020; Shaw, 2015). For our argument, analysing the relations and feedback
processes of the assemblage of humans and machines, or more concretely,

the relation between speech and mobility impaired people and the technology they are becoming with, the process of establishing stable states is especially interesting.

Take for example an incident from a technology conference for disabled back in 2000, entitled Being Independent. A man demonstrates a motorised wheelchair that can walk on stairs and stand upright. He proudly comments, 'Now you can lift yourself up and talk with standing people on their level of height', to an audience impressed by this technology (Foss, 2002b). After the demonstration, a salesperson approached Jon, one of the main characters in the ethnography this chapter builds upon, saying, 'It's okay isn't it? Hahaha'. He was enthusiastic about how wheelchair users could now 'stand upright', alongside other 'normals'. Jon, however, replied in a stoic manner, pointing with spastic finger movements to a hardwood letterboard, lying across his lap in his low-tech but sturdy wheelchair: 'It should stand straighter' (i.e., not so laid back). Jon was not as impressed as the rest of the audience, and was also less certain as to how this tool could assist him. Jon, for his part, was more concerned with everyday tasks and his work as a computer programmer and special aids entrepreneur. It was clear that he did not consider this technology to be as useful as his own bespoke designs, based on a specific mixture of analogue and digital technologies. Jon, we would argue, is more concerned with continuously becoming independent, and thus wonders how this technology might impede him in becoming increasingly more independent. The distinction between being and becoming is that 'becoming' is acutely aware that independence is an emergent quality, made possible through the many lively human and nonhuman elements conspiring to create this (relatively) stable state. Introducing new, apparently unstable, technologies into this assemblage potentially destabilises an otherwise stable condition. Being independent is not something you are, rather independence is a question of continuous becomings, as the 'steersman' adjusts to uphold independence, or relative control, in a constantly changing environment. The technologies that Jon and Thomas interweave ensure that they are continuously becoming independent, a fact of which they are acutely aware.

Though early cybernetics drew attention to the possibility of thinking that human communication was both analogue and digital, they were also attentive to the fact that purifying one over the other would lead to a loss of information. For example, an important contributor to systems theory was Anthony Wilden, who writes: 'Digitalization is thus a TOOL employed

to maintain an overall analogue relation: the survival of the ecosystem as a whole' (Wilden, 1977, p. 55). The emphasis on the digital as a tool to maintain analogue relations underlines the importance of acknowledging the fact that human communication is both analogue and digital. The analogue dimension of communication, which involves things like body language, voice intonation, or the rhythm of a conversation, is continuous and context dependent. The digital dimension of communication, which involves the human capacity for verbal speech and use of abstract signs like the alphabet or numbers, is discontinuous and can be context independent. The analogue may of course be partly translated through digitalisation, however, never at the risk of something being lost in the translation. In our attempt to understand the man/machine relationship, we argue that there is a need to be attentive to the fact that technologies are tools to assist in certain endeavours.

In a society that is now replete with technology enabling the streamlining of digital communication to various degrees, we need to be attentive and sensitive to the importance of the analogue aspects of human communication. Early cybernetics were attentive to the fact that, in practice, human communication is both analogue and digital at the same time. However, purifying one dimension at the expense of another will potentially have consequences for homeostasis, the relatively stable state of an assemblage. Or, it potentially destabilises the process of becoming independent, thus affecting our informants' struggle to maintain and develop their independence.

In the example above, we were concerned with man-machine, wheelchair-environment, and Jon's dismissal of the (out)standing wheelchair. His dismissal was not based on scepticism towards technology in general. Rather, it was based on doubting this particular technology, and how it might destabilise his independence. The current digitalisation of society has enormous influence on how we humans relate, and our ability to interact. Digitalisation impacts government infrastructures, public spaces, as well as everyday social interactions. With these substantial changes to the very fabric of society, we argue for critical attention to be paid to these technological developments, to harness the best, while at the same time working to limit unintended negative impacts on our lives and societies. In the drive to digitalise society, we need to develop a critique, especially when we deal with people who are less able to articulate such a critique themselves.

Ethnographic Sensibilities

The ethnography that this chapter builds on was produced by the first author through two years of fieldwork among a multidisciplinary state-run service division and their clients, during the period 1999–2001 (Foss, 2002a). Their mandate was to develop and disseminate knowledge on information and communication technologies (ICTs) for speech and mobility impaired people. Following actor-network theory (ANT) (Latour, 1987, 1993; Latour & Woolgar, 1986; Law, 2007), this unit could be seen as a laboratory for knowledge production where the fieldwork consisted of following the actor-networks of the sociotechnical assemblages in question. This strategy necessarily implied following their interaction with their clients, and their clients' interaction with others, with and through the technologies at their end. Some of the clients also had learning difficulties, and were excluded from the study due to ethical considerations of ability to consent to participation. One could argue that 20-year-old ethnography in the field of technology is outdated (though there have been follow-ups). However, we think that some of the resistance and accommodations demonstrated by Jon and Thomas, amongst others, may exemplify some of the potential traps of overeager implementation of digital technologies.

As much of the work of the multidisciplinary, technoscientific team (or laboratory) was of an abstract nature, and communication with their clients was to a large extent nonverbal, ethnographic film was used as a method (Foss, 2002b; MacDougall, 2006; MacDougall & Taylor, 1998). This way the ethnographer established a complementary role within the team, since they found film useful also as a tool for their own reflexive processes, and for dissemination purposes. In the perspective of ANT, the video camera also became an *actant* in the ethnographer's interaction with Jon and Thomas, amongst others, in a form of collaborative storytelling. Often, Jon and Thomas led the way and pointed out what they wanted to be filmed, and sometimes used the camera interaction to highlight situations of marginalisation or even discrimination. An example from the mentioned aids fair, when Jon asked another salesman a question, the salesman replied by talking to the interpreter above the head of Jon in his wheelchair. Eventually, Jon interrupted by poking his arm at the salesman's hip, then typing the following sentence on his hardwood letterboard: 'Hey, talk to me (not the interpreter)!', whereby he looked into the camera with a triumphant grin. As the situation was being filmed, he said in-between, 'And by the way,

you are on camera'. The salesman apologised and continued talking more directly with Jon, lowering himself to his height.

A key methodological reason for entering this field was ANT's perspective on the blackboxing of actor-networks, allowing technology and knowledge, i.e., technoscience, to appear as apolitical objects. The point of departure entering this fieldwork in a knowledge producing laboratory was that standardised technology for non-standardised bodies might produce opportunities to unblackbox normality standards, i.e., destabilise the orderings of normal. Also, the aim was to investigate creative appropriations and resistance from the user end. Participant observation (Malinowski, 2002) and analytic autoethnography (Anderson, 2006) are important methodological tools to grasp and describe the subtleties and intricate situations in which the analogue dimension of communication became evident. As we will argue, ethnographic sensitivities (Stewart, 1998) are especially necessary in understanding the importance of the more-than-digital dimensions of communication.

Design from Below

A challenge for developing a constructive critique of technology is its apparently neutral appearance and ability to become naturalised through implementing standards for normality. However, as Susan Leigh Star notes, the consequence of the standards that technologies bring with them, also have the potential to create 'monsters' out of those who are not able to adjust to these standards (Star, 1991). We are confronted with the unintended marginalising effects of standardisation. As opposed to the commonsensical notion of technology as a neutral means, thus apolitical, critical theory claims that technology is ideological (Feenberg, 1991; Marcuse, 1964, p. 11). This insight has later been demonstrated at large by many STS scholars (Akrich, 1992; Gomart, 1999; Latour, 2005; Law & Hassard, 1999, to name a few). According to philosopher of technology, Andrew Feenberg (2017), new technologies, disguised as politically neutral, first and foremost contribute to the reproduction of dominant ideologies. For instance, the smartphone is a wonderful tool for the expansion of neoliberalism (Eriksen, 2021). Nonetheless, democratic interventions in the widely assumed apolitical sphere of technology are possible as long as participant interests, i.e. *alternative rationality from below* (Feenberg, 2017, p. 8), are integrated into sociotechnical design-use dynamics. In this

perspective, Jon and Thomas could be understood as proponents of alternative rationality from the margins of a dominant normality, in ways that may crack open (or widen) that normal.

Following Feenberg's request for a more democratic technical policy, we are interested in what we call *design from below* (Foss, 2002a), meaning users' tactical responses to new technologies. Our main research question is: How might we imagine alternatives to the brute orderings (or narrowing) of the normal, as defined by sociotechnical standards in relation to technical design processes in digital society? Also, we argue that we need to dive into the nitty-gritty mundanity of sociotechnical assemblages in order to grasp how 'matter matters' (Barad, 2003). As Feenberg (2017) emphasises, democratic interventions in the field of technology are not revolutionary in form, but rather unfold through everyday negotiations, often tacit and invisible. From the standpoint of critical theory, he pleads for a more concrete insight into alternative rationality from below. From this ethnography, we attempt to tease out some ethnographic details illustrating the problems for some of the more disadvantaged people in society, and their rationality from below, when confronted with processes of streamlining digital communication, and how they resist.

Attempts to Digitalise Speech: Resistance from the Margins

Thomas is a user of augmentative and alternative communication (AAC) (Light & McNaughton, 2014), due to cerebral palsy. As he cannot speak with his voice nor control his arm and finger movements, Thomas communicates through other means, usually with the help of a translator who knows him well. Since early childhood, Thomas acquired the symbol-language, Bliss, named after its Austrian developer, Charles Bliss (1949). After World War II, Bliss created an easy to learn international auxiliary language, inspired by Chinese symbols, aimed at supporting world peace by easing communication among different linguistic communities. Although Bliss symbols never achieved their intended function, from the 1960s the symbol language became increasingly popular within AAC for people with learning and communication difficulties (Okrent, 2009). When you cannot communicate with your own voice, and your body resists using sign language or the like, communication is often done by means of pointing at characters or symbols with the parts of your body that you can control.

In Thomas's case he is in full control of his eye movements, and partly his head movements. Clearly for AAC users, the actual speed of pointing at letters, words or symbols is absolutely of the essence, to be able to engage in complex meaning production and dialogue.

For Thomas, Bliss has the potential for much faster communication than, for example typewriting. Bliss consists of more than 300 symbols, which can be combined in a variety of ways, and enables the construction of complex, abstract, and multivocal expressions. According to special educator, Elisabeth (informant), Bliss is the only AAC language that allows for real linguistic creativity. Further, she claims that acquiring Bliss or other AAC languages must be understood as equally complex learning processes as acquiring a second language. Consequently, she maintains that AAC users should be considered bilingual, like in the case of Thomas (Foss, 2002a, p. 16).

Embodying Bliss since childhood: Thirteen years old, Thomas wrote a crime novel with the assistance of his teacher, using a head torch pointing at Bliss symbols on various Bliss tables. Today, Thomas's main medium for communication is a larger Bliss table (about 1.2 × 0.7 m), organised in a coordinate system, with categories of symbols grouped into coloured fields. The way he operates the table is by pointing with his eye movements, helped by a human translator. First, he points out a coloured field, then a number along the X and the Y axis, finally circling down to the actual symbol, or a predefined combination of symbols. Since the symbols are subtitled in Norwegian (or whatever written language), the translator can communicate with Thomas without knowing Bliss, and then read the stated meaning for Thomas to reject or confirm. Obviously, this form of communication is not very fast compared to ordinary speech, but with a trained translator who knows Thomas well, and hence helps by predicting half-stated sentences to speed up communication, it is quite impressive how quickly he manages to formulate statements, jokes, and allusions. As a fieldworker with no former experience with this type of communication, Espen tried to communicate directly with Thomas, deciphering his eye-pointing at the Bliss board. After a bit of trial and error, they managed to communicate directly fairly well, due to the intuitive coordinator system and the Norwegian subtitles, however not as fast as with experienced translators.

Smart house and smart digitalisation? Thomas lives in a so-called smart house that he controls with a high-tech wheelchair, named Rolltalk. He can move around the house by himself, and the Rolltalk enables control of

certain electronic devices, such as lights, curtains and the stereo (Thomas is a Metal fan). Rolltalk also has a message system, which allows making simple prerecorded oral messages like, 'I am thirsty'. This works by navigating a hierarchical menu system, visualised on a monitor on the front of the Rolltalk, where a pointer ticks around headers/symbols in a monotonous fashion. When the pointer is on the right spot, Thomas clicks by knocking his head at a sensor in the neck support of the chair, and the next menu opens. This is quite efficient for Thomas to express basic needs, and to control certain functions in his house. However, when Thomas tried out similar technology on a word processing PC (pointing with a reflector sticker on his forehead at the hierarchical menu system for choosing letters) it was dreadfully slow in comparison to the much faster and dynamic use of the Bliss board + translator.

At the time, his technical assistant and computer teacher asked if Thomas would like to try out Bliss on the Rolltalk. He explained that it would be good if Thomas could 'communicate using normal speech'. Thomas replied teasingly, 'OK, considering I have been a guinea pig for everything new (technology) my whole life'. Thomas explained that his motivation was to 'speak a bit more directly with people who cannot use the Bliss board'. As Thomas now was in his mid-twenties, he was also eager to write a new novel. He explained, however, that it takes a lot of time with the Bliss table and that he would need a devoted translator + secretary, and his existing helpers did not have the time to assist with this. So, if the Rolltalk could speed up writing without a Bliss translator it would be helpful. Thomas's father, on the other hand, explained that he hoped having Bliss on the Rolltalk would give Thomas 'his own (digital) voice'. Thomas's computer teacher also emphasised that Thomas could probably benefit from 'finding pride in mastering advanced technology'.

Refusing the digitalisation of Bliss: After a period of trial and error of digitalising Bliss from the analogue eye-pointing Bliss table to the Rolltalk hierarchical head-clicking menu system, Thomas said, 'No, I don't want to try out Bliss on Rolltalk anymore'. Why this sudden resistance? According to one of his helpers, Thomas was afraid that a possible consequence might be that the old analogue Bliss table would be taken away from him. The digital could potentially replace the analogue, instead of being a supplement. Later during fieldwork, Espen realised that Thomas cannot see the Bliss symbols when using the Bliss board with an interpreter. Placed on the lap of the translator, the board is normally too far away for the eyes to catch

the small symbols on the large board, two or three meters away (he sitting in his wheelchair and the interpreter on a chair at a distance). However, having embodied the Bliss board since childhood, Thomas knows the position of each symbol by heart, like touch typing on a keyboard without looking down. His body just knows where to 'click' in the weave of meaning. In other words, the efficiency of the Bliss board cannot be understood without considering Thomas's embodied eye-pointing manoeuvring of it, a profound component of his ability to communicate and engage in social interaction.

Following the assemblage approach, Thomas and the analogue Bliss board, together with the translator who also predicts from half-formulated meaning, become a cooperating unit that together constitute his articulation, or voice, in dialogue with others. Accordingly, Thomas was afraid that the well intentioned, techno-optimistic strive towards digitalisation of the analogue Bliss table to the digital logic of Rolltalk, based on ideas of normalisation, eventually could have the effect of his losing the old Bliss board. The hierarchical menu system of the Rolltalk could not by any means match the relative speed and dialogical flexibility of the assemblage of Thomas, his embodied eye-pointing, the Bliss board, and phrase-guessing human translator who obviously also serves an important social function in his lifeworld. Such a simple digitalisation of his silent yet highly visual voice would potentially set him back many years in his ability to communicate. Thomas was, nevertheless, not able to articulate the details of this potential marginalisation in the name of digitalising communication under a normalisation regime. He could only resist (Scott, 1987).

The Monsters of Standards and Orderings of Normality

In Norway, the overall strategy for including the disabled is normalisation: 'A normalizing care means that disabled will be able to lead a life much like other people' (Tøssebro, 1996, p. 9). This strategy springs from a critique of the former reductionist notion of disability as a trait within the individual. Accordingly, policy focuses on the 'co-operation between individual traits, surroundings and particular situations' (Molden, 2012, pp. 15–26). Nevertheless, such a normalising strategy seems to be trapped in a Catch 22 situation. Amongst others, the sociologist Ingunn Moser (2005) argues how this constitution of disability is doomed to fail, that is, it produces

unintended marginalisation. Working towards inclusion by normalising through compensatory technologies will always leave the user with a *lack* of independence, seemingly as opposed to a certain normal:

> In this way, normalization contributes to the reproduction of the differences and asymmetries that it seeks to escape and undo. In this sense, normalization itself cannot succeed and neither can policies and welfare services that build on the principles of normalization. (Moser, 2005, p. 678)

Moser builds on the argument by Susan Leigh Star in *The disembodied mind* (1991), in which standardisation on the basis of a statistical normal inadvertently creates a monster. Standards enable and create order and standards for people with statistically average bodies and subjectivities. These are individuals who act 'autonomously' according to the deeply manifested, normative modernist idea of a disembodied mind. This widespread Western ideology of the person claims that an autonomous person is independent of her surroundings, material as well as social, being able to think and make choices independent of the body (Bauman, 1997; Star, 1991; Taylor, 1989). Star argues that standards made for a statistically average person mask the actual dependence of all people upon bodies, technologies, and other people, hence representing the notion of a disembodied mind. However, those who fail to measure up to these standards are systematically cast as the *other*, given that the expression of their dependence is doubly amplified. Not only are they perceived as *dis*abled because they deviate from the statistical norm, but also the visibility of their dependence on either humans or non-humans, helpers and technology, amplifies the contrast to the statistically normal, seemingly independent subject.

In other words, an ideology of normalisation leading to independence may in fact lead to the opposite, while creating a threshold impossible for some to overcome, and therefore perhaps would not even be desirable in the first place. We argue that such a normalisation strategy might be especially problematic in a digital society, as there is a strong political, techno-optimistic drive towards digitalisation and compensatory technology (Coyne, 1999), coupled with the ideology that technology is a good in itself, as well as a neutral means of compensating for deficiency. However, returning to Feenberg, whether new technologies lead to further exclusion of marginalised groups by tightening the normal, or whether the conditions

for this normality should be challenged, expanded, or relativised through democratic interventions from below, are empirical questions.

There is no doubt that new technologies give Thomas and other mobility and speech impaired people wonderful opportunities to gain more independence and enhanced agency. Nevertheless, the story of Thomas demonstrates the potential dangers of a biased techno-optimistic strive for the digitalisation of welfare technology, where the main narrative is that digitalisation is a neutral means of enhancing welfare and independence, and thus an intrinsic good and a goal in itself (Tøndel, 2018). Thomas's embodied knowledge of eye-pointing with the Bliss board can, in Feenberg's perspective, be understood as alternative rationality, alternative to the hegemonic technoscience of the time. Thomas's micropolitical resistance to further digitalisation of the analogue Bliss table shows that he is caught up in a marginalised power relationship. Users of whatever technology is existential for them to communicate do have knowledge about the specific socio-material entanglements through which they become, but may not always be able to express this. Refusing the analogue dimension of communication in feedback processes is consequential for meaning. The idea(ology) that you can create less friction through streamlining digital communication technology potentially undermines people's ability to communicate in the first place. The ability to perform communicative acts is reduced.

Assemblage theory allows us to see behind the praise of welfare technology and digitalisation, digging into the mundane complexities of the human-nonhuman assemblages that enable agency. Perhaps social workers, performing public policy as street-level bureaucrats with their clients, as well as being part of their intimate actor-networks, should be elevated as significant advocates and translators of the tacit and embodied alternative rationalities of their service users in design-use processes of new technologies. In the perspective of assemblage analysis, technology is not a 'thing', and is hence much more plastic and dynamic than what appears when black-boxed as a neutral means. The following story of Jon may be an example of that.

'I Am not Disabled': Jon's Story

Like Thomas, Jon was born with cerebral palsy, however he finished high school and masters several computer languages. He has developed several

of his own assistant tools, which he also sells through his own company. A few years after fieldwork, Espen invited Jon to his university for a lecture on rehabilitation. After watching the mentioned ethnographic film, a student asked Jon how he experienced being disabled. Jon retorted, 'I am not disabled'. The students seemed confused and asked him to explain. He replied, 'Disability is when you have lost an ability that you used to have'. From infancy, Jon has needed assistance to eat, dress, move, communicate, etc. Through hard work, education, and developing his own bespoke assistance tools, Jon has been able to expand his sociotechnical agency massively. At the same time, he is very aware of his dependence on both technology and assistants, which he knows how to acknowledge and appreciate.

Amongst other technical aids, Jon has developed the communication tool PhoneTalker that allows him to speak on the phone with friends or even strangers without having a human interpreter present. The main reason stated by the AAC users in this study for not wanting to always have an interpreter, is the need for privacy. Nevertheless, as emphasised earlier, the interpreter plays an important role in speeding up the communicative labour of struggling bodies by guessing half-stated phrases. So how can one digitalise the highly analogue function of the interpreter, bearing in mind that a good established relationship between user and interpreter is important for both quality and speed of translation?

Though there are different solutions for machine guessing programs, fieldwork revealed that users seldom choose this function when communicating digitally. Even though machine guessing can reduce the number of tabs you need to push, this function does not seem to reduce the overall speed of communication. According to Fredrik (informant), a specialist in AAC and new media, the reason is that the user may lose concentration, given that their gaze and attention are divided between typing and the visual prediction being suggested on the screen. When typing speed is initially slow, these breaks in concentration can be decisive. More time and energy are spent getting back into sentence building again, and remembering 'where' you are in the sentence. Hence, what is gained by saving a few tabs is lost in digital prediction.

Jon, Thomas, and other AAC users report similar findings in relation to machine prediction. However, with his 'double education in wheelchairing and programming', as he phrases it, Jon has found a temporary solution for himself. He realised he could use an auditive intersection for machine

guessing, allowing him to keep visual focus on typing on the keyboard with his headstick.

Jon prefers his own innovations, rather than similar tools on the market. His knowledge as a speech impaired wheelchair user, and as a computer programmer, has implications for his communicative agency and his ability to influence a material-expressive order. For example, Espen has been amazed several times by how Jon, despite the difficulties inherent in his communicative work, manages to establish good communications with other people, and to draw their attention. A tactical aspect of Jon's communicative practice relates to an apparently technical detail in the PhoneTalker program. During a user convention (1999) neither Espen nor the other professionals present understood this 'detail', which Espen would later experience as having communicative value. In the aftermath of the user convention, the people in the previously mentioned multidisciplinary state-run service division wondered why Jon had chosen to equip his self-developed PhoneTalker with a microphone in the room. Even though the digitalised voice is wired directly to the phone line, without detouring via the room, to get the best possible sound quality. At first, we did not understand why Jon would complicate this excellent solution for verbal distance communication with a microphone that only conveyed wordless spatial sounds and general noise.

The answer was demonstrated when Kjersti and Anne called Jon a few days after the convention to see how the phone voice worked over a distance. After some rings we heard his familiar voice saying, 'Hey, this is Jon', followed by a chuckle. When Kjersti and Anne asked what he thought about the convention, he retorted that it was good, though somewhat limited when it came to demonstrating and testing technology. As the only computer programmer at the convention, he had not learned very much new, though he appreciated the social part of it. When Jon deactivates the hearing prediction program during the phone conversation to avoid confusion, the conversation partner needs to be patient while he letters out the sentence using a headstick on the computer keyboard. After a while it became quiet on the other side of the line, and we got the impression that Jon wanted to end the conversation. Kjersti and Anne said, 'Bye', and were about to hang up. Then we heard clicking noises on the other end of the line. Jon wanted to say more. The microphone conveyed the clicking of the tabs on his intentionally chosen 'old' IBM keyboard, which makes relatively loud clicking sounds. Jon's 'intonation' made his conversation

partners understand that the conversation was not over. These sounds gave the listeners a signal not to intervene while writing sentences, or to end the conversation before he was done. Handling the keyboard with his headstick takes time, and his insistence on the sound of the keyboard underscores his intentions.

Both Jon and Espen have, during and after fieldwork, communicated several times via telephone and PhoneTalker. One evening Espen called Jon, and an assistant answered the phone. Jon was having supper and the computer was off. The assistant translated Jon's pointing at his analogue letterboard on his lap, instead of turning on PhoneTalker (to spare time rebooting). Usually, Jon and Espen have a good tone and dialogue. However, this evening Espen did not experience talking with Jon at all. The interpreter's voice dominated Espen's attention, and hindered direct conversation and the personal connection they usually had via phone. A few days later Espen called Jon back. This time he answered himself via PhoneTalker, and they had a longer conversation. When Espen asked why he chose to use PhoneTalker with a microphone in the room in addition to the digitalised voice, he said, 'You need to hear me', followed by a humorous chuckling. Even though Jon's digitalised dialect from western Norway is monotonous, without varying nuances of tone or strength, Espen could make out, given the microphone-mediated 'room noise', how his wordless voice emphasised the last word: ME. The 'room noise' included his non-verbal voice, the intensity of his typing on the computer, and his bodily movements in the squeaky wheelchair, constituted an analogue complement to his digitalised voice. This gesture of sound allowed Espen not only to hear and sense Jon's verbal meaning construction, but also his emotional state.

This is one of several self-experienced examples of how the 'room noise' becomes a central part of the message in the telephone conversation with Jon, communicating both the digital and the analogue. Given the previous, failed interpreter-mediated telephone conversation, Espen became acutely aware how non-verbal body sounds contributed to sensing Jon's presence more firmly and directly than any assistant or digitalised voice could mediate. Jon's communicative prosthesis, creating an assemblage of the PhoneTalker software, a text-based interface, the digitalised male western Norway dialect, a microphone recording room noise, the embodied wheelchair, the telephone, a forehead pen, and an old school IBM keyboard, makes possible interpreter free, long-distance, personal communication. This form of communication is not purely written or oral,

verbal or non-verbal, technical or organic, rather it is a combination of all the aforementioned elements.

Analog/digital Assemblage: The Sound of Disability

> Conceptually, the notion of 'differently constrained lives' defines not only 'lives with disabilities,' but *all* forms of life in relation to an impossible 'non-constrained,' 'non-disabled' state. As all lives are subtractions from an ideal state, each life needs to be considered as a 'singular life' with singular constraints, which means that in the gradations of constraints it is no longer a question of 'the normal' set against 'the abnormal,' but one of a specifically constrained position within a given multiplicity.
>
> —Berressem, 2017, pp. 30–31

As Berressem argues in the above quote, in the vast multiple variations of the human condition we are all constrained in various degrees and ways. What is interesting is how we deal with these constraints. Becoming independent for Jon and Thomas requires an intense interaction with various types of technologies, as well as human helpers, and their paths are 'differently constrained lives'. Understanding their cases through assemblage analysis draws our attention to the fact that ignoring, reducing, or eliminating the analogue dimension of communication in the feedback process might influence the homeostasis of a fragile independence. *You need to hear me*, Jon emphasises.

Digital technologies might be helpful in maintaining the desired independence of Thomas and Jon, but they might also destabilise this very same independence, as central components of what becomes lost in digital translations. As such, we argue that there is a need for ethnographic data to be sensitive to technological innovations that streamline digital communication at the cost of the analogue. Thus, design processes should begin from 'below', and in concrete everyday practices, to ensure that the various effects generated are desired from the user's standpoint. Jon's story demonstrates that when *alternative rationality from below* is incorporated into technical design, sociotechnical agency may be enhanced in ways that exceed the brute ordering of 'the normal', allowing for elegant combinations of both

the digital and the analogue. Thomas's story likewise shows the potential
dangers of unintended marginalisation, if such rationality is not taken into
account within a techno-optimistic normalisation strategy in the name of
digitalisation.

The rapid digitalisation of the welfare state may, however, relativise
the orderings of normality in terms of communication, and create new
possibilities as well as barriers, for people with both standardised and
non-standardised bodies and subjectivities. The physically disabled may
participate through digitally mediated arenas in ways that were unthink-
able a few years back, while the non-disabled may experience exclusion
from social arenas and digitalised welfare services in new ways. In other
words, new forms of sociotechnical agency will emerge in digital society
(Feenberg, 2017, p. 4). In *Abilism: The causes and consequences of disability
prejudice* (2020), Michell Nario-Redmund reminds us that about one in five
people qualify as disabled, being born into or becoming disabled during
their lives. Restrictive environments have been a central feature in disabled
peoples' fight for rights. Free and unrestricted access to public places and
educational facilities have been important in addressing disability preju-
dice. Changes to our welfare state infrastructure through digitalisation
impact both the built environment and the legislative landscape in which
abilism unfolds (Nario-Redmond, 2020, p. 352). Thus, we need to be atten-
tive to how digitalisation influences the ability to communicate.

Becoming independent is not simply a question of personal satisfaction.
It is also a question of realising the potential of inclusive citizenship (Lister,
2007). Ruth Lister argues that there are many ways of practicing citizenship.
Disability activism is one, through which disabled people '… struggle for
full, equal and accessible citizenship and for the right to be different citizens'
(2007, p. 54). To realise their potential and build an inclusive citizenship
for speech and mobility impaired citizens like Jon and Thomas, we need
to be attentive to how they can express themselves, and how they want to
express themselves.

For Jon, personal autonomy is the bottom line, expressed through his
own becomings with various technical solutions and everyday practices.
He is self-normalising, in that he identifies with the Norwegian community
of working taxpayers. However, rather than simply passively reproducing
norms for individuality and similarity, he is constantly engaged in nego-
tiations relating to norms. He actively uses technology to realise himself
and his identity. In one example, Jon demonstrates one way of conducting

negotiations about his otherness. Espen visited Jon in a rehabilitation centre, where Jon stayed from time to time. A nurse came into the room and asked if he wanted supper. Jon said he would love to have some, and started to explain how he wanted to be fed. He asked for only half-filled, small, sturdy glasses, if not things tended to be bloody messy. Understated was the fact that his uncontrollable jaw muscles could easily break a glass. The nurse interpreted Jon's hand-pointing at his analogue keyboard, and it was evident that Jon saw that the nurse became stressed by all the necessary adjustments, and the various risks of spilling food, and blood. Jon noticed, and commented jokingly, 'You see, I am just a little bit odd!' The nurse laughed and left the room, now more at ease.

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