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Design for Self-inclusion: supporting emotional capability

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This paper contributes to inclusive design. It seeks to extend the current definition of Inclusive Design, addressing motion, sensory and cognitive capability, by introducing emotional capability for self-inclusion as an additional component. To illustrate this perspective, the paper presents two constructive design research cases of designing for self-inclusion. One of these cases presents a finished design to support autistic children in self-inclusion. The other case presents a design exploration method to support participants in determining the emotional priorities which should underlie design interventions. The participants in this case sought to compensate a physical disability, one, a permanent one, and the other, a temporary one. The second case is presented in order to show the potential of starting from the experience of situations rather than specific design goals. The paper concludes that valuable design potential can arise from emotional and experiential insights from combined embodiment and participatory design activities.

inclusive design, emotion, constructive design research, self-inclusion

1 Introduction

The domain of Inclusive Design mostly tends to address designing for three dimensions of capability: motion, sensory and cognitive capability (Clarkson & Coleman, 2015). This is evidenced, for example, in a recent compilation of Inclusive Design contributions (Langdon et al, 2014) focusing mostly on product and environmental solutions, as well as the recent Microsoft Inclusive Design Toolkit (2015). The latter addresses visual, speech, auditory and touch capabilities and various levels of impairments in them. Where is the social, the emotional dimension of those towards whom Inclusive Design is directed? Only a few of contributions in Langdon et al (2014) address it. The term 'emotional' only occurs on five of the 275 pages, and never in relation to the state of the person to whom Inclusive Design is directed. The term 'social' occurs often, but also mostly in the context of an outside, generalised perspective. Two chapters focus on social inclusion but in relation to a specific activity or architectural environment. The term 'empower' is absent, although it has been explored elsewhere for disability (van Dijk et al, 2016). Only one chapter, by Holt, Moore & Beckett (2014) specifically addresses the experience of social, experiential inclusion and exclusion as a main topic. It does so in the context of children's play, acknowledging the significance of social barriers, yet in the solution



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space also goes on to focus on the design of the games themselves. Goldhaber et al (2014)'s chapter addresses self-exclusion mechanisms for the case of women and computing, but does not propose any concrete strategies to address it, beyond a general recommendation to encourage a flexible self-view towards learning. An experience such as 'independence', as someone's subjective desire, is only mentioned once in the compilation (Andrews, 2014, p. 211). Earlier contributions to the Inclusive Design domain were still closer to the initial needs that helped establish the domain. In Clarkson, Coleman, Keates and Lebbon's (2003) primer, Bieber (2003) presented an impassioned plea outlining her "struggle for independence". Though listing all the products and environments causing impairment, the contribution also highlights all the emotions that come with dis- or enablement: frustration, stress, but also enjoyment and satisfaction. Moore's (1985) famous self-experiment with social exclusion described its emotional repercussions evocatively.

This paper picks up on the emotional aspects of inclusion and proposes two explorations in this direction, with examples. To illustrate how emotional aspects are not currently prominently addressed in it, I first explore how Inclusive Design has been conceptualised and how it defines its aims.

1.1 Aims of Inclusive Design

Inclusive Design aims at the "integration of older and disabled people in the mainstream", "as active, participating and contributing members of society", through "products and services that delight the end-user, rather than stigmatise and alienate" (Clarkson & Coleman, 2015, p. 235 and 245). The economic and scale aspect of Inclusive Design is revealed in this older definition in the British Standard 7000 Part 6: "[The] design of mainstream products ... that are accessible to, and usable by, as many people as reasonably possible on a global basis, in a wide variety of situations and to the greatest extent possible without the need for special adaptation or specialized design." (Keates, 2004). The definition can be taken to imply that the desired (also experiential) inclusion relates to becoming more similar to others - in fact, the many others, the mainstream - through product use. If most people drive cars, Inclusive Design is about enabling someone to drive a car too, in a way that is adapted to their particular capabilities, and hence to be more similar to others, the mainstream.

The social model in disability studies (Thomas, 2004) points to the fact that disability is not only about the way society views disabled people and disability, but also about disabled people's own experience of life. The United Nations (UN) Convention on the Rights of Persons with Disabilities (CRPD) reflects the change from a former medical model to a social model in which disability is understood to result 'from the interaction between persons with impairments and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others' (Berghs et al 2016, p. 1). Lim and Nickpour (2015) have broadened the scope of Inclusive Design considerably by reviewing the psychosocial dimensions that could pertain to it. Still, these contributions also focus on the direct interaction between people and products, with the aim of mainstreaming the consideration of diverse motion, sensory and cognitive capabilities.

Similarly to the Microsoft Inclusive Design Toolkit mentioned earlier, Clarkson & Coleman (2015) define as relevant three dimensions of capability: motion, sensory and cognitive capability. Capabilities can be related within individual people, for example that a young person with limited eyesight may have very acute hearing to supplement a low level of visual information. The example shows that this person has also likely gained experiences throughout their life through which they have adapted to contextual experience. Living through such adaptations likely also triggers emotional experiences and reflections on one's position in life and on one's relationships with others. This can lead to greater insecurity as in the example of Goldtaler's research on women and computing (2014), but it can conceivably also lead to a more mature capability of self-inclusion, and strategies for it. The Inclusive Design field could learn from these.

An additional view of Inclusive Design is conceivable: that of supporting people in fulfilling needs, such as for social connection with others, aided by designs that facilitate this fulfilment in more ways

than connecting with a mainstream. From the perspective of Self Determination Theory (Ryan & Deci, 2000), people need relatedness, autonomy and competence. Such relatedness does not necessarily have to be to a mainstream. Besides wanting to be like everyone, people also seek out direct social connection with a diversity of those around them. How could this be addressed?

I contend that an additional layer of Inclusive Design could be that of a facilitator in which designs or interventions have an enabling role for a person to enhance their experience of life and their resilience in society, beyond physical adaptation. Such an approach could enable people with disabilities to position and assert themselves and their design needs better. That is why I propose an approach to Inclusive Design that is focused on the experience of situations and how to support a person's needs, rather than mainly on the development of products to compensate for specific disabilities. This may contribute particularly to users being designers or at least participating in the design process (Zhang and Dong, 2016), by supporting their own recognition of their unique experience rather than only the physical make-up of situations. Such an additional view is not proposed as an alternative to the current definition of Inclusive Design but could rather serve as an additional layer. The ambition to mainstream inclusive design remains an important social and economic societal ambition. To this literature I add a focus on the experience of those involved as elicited through combined embodiment and participatory design activities. An outlook is provided into how these insights can be made productive in the design process.

This paper presents two cases that were specifically selected to illustrate enablement in experience, facilitating self-inclusion rather than designing for the users' capabilities. I will show two cases, each with a different angle on experiential self-inclusion. Each sheds light on an example situation: one, where a change in the person is the key object of inclusive design. One, where a change in a person's product ecology is the key object of inclusive design, where someone is highly aware and critical of how an inclusive solution (a wheelchair) does not sufficiently support her in her entirety as a person. And as a second participant in that case, where a person lacks this awareness entirely yet is affected similarly.

2 Method

Both cases are based in design education activities and are constructive design research cases (Koskinen et al, 2011), linked through a programmatic interest in the topic of inclusivity in design for experience. This means, a thread of inquiry into this is continued throughout successive cases (Binder & Redström, 2006). The design cases rely on an approach emphasizing embodiment (Boess, Hummels & Saakes, 2007; van Dijk & Verhoeven, 2016). With this is meant, studying any issue not only intellectually with hermeneutic tools such as visualisations, but physically and contextually by actually experiencing the interactions at hand. A pioneer in inclusive design of this approach is Patricia Moore who built inclusive design consultancy on her own earlier experience (1985), putting deciders in the situations over which they had decision power. For example, asking executives to sit in wheelchairs and then waiting until they had to go to the toilet in one of their properties. Embodiment has also widely been adopted in human computer interaction design because of its dynamic and contextual nature, which resulted in a need to enact the contribution of digital artifacts in contexts of use (Boess et al., 2007).

3 Case 1: Self-inclusion: a tactile emotional approach

The first case is about designing for autistic children. The possibilities of touch encouraged us to explore and research the world and life of an autistic child in order to design something which persona Tommy will benefit from. We have described the development of Fuzzy Bird elsewhere (Boess et al., 2017). Here I present this case to show an example of designing to facilitate emotional self-inclusion.

3.1 Designing inclusion for autism

Van Rijn and Stappers (2008) sketched an evocative picture of how children on the autistic spectrum experience the world: it is a challenge for them to integrate many sensory impressions. In consequence, they frequently withdraw or get stressed in social interaction, which in turn impedes their social connections. An example is the integration of auditory impressions: children on the spectrum find it difficult, which easily leads to sensory overload. A frequently tested intervention is the use of headphones, which is why we created a persona who often wears headphones (Ikuta et al., 2016) (Figure 1). One in 70 to 100 children is diagnosed as being on the autism spectrum (www.autismspeaks.org/what-autism, www.autismeurope.org/about-autism).

We wanted our persona Tommy to be able to participate, to get included on a social level. What prevents Tommy from participating? In autism emotion leads to self-isolation, but it can be addressed in some high-functioning cases, and Tommy can be enabled to include himself better in social interactions. Rather than creating special environments or products for Tommy as a member of a specific group, people on the autism spectrum, our aim was to design something that will enable him to develop the skills to include himself in social connections. The barrier Tommy needs to overcome in this is his own anxiety and aversion to engage in social interaction. He needed to learn to dare to be more open in new and unexpected situations, so he can feel more socially included. Helping Tommy feel confident in this sense would be very beneficial for the development of his social skills and eventually help him to develop the skills to include himself in social connection.

3.2 Transitional objects for social self-inclusion

Van Rijn and Stappers (2008) describe elements to take into account when designing for autism: 1. give them a feeling of being in control 2. provide a structured situation, 3. let them create a structure themselves, 4. make use of their special interests 5. facilitate their excellent memory 6. reward them with sensory experiences 7. facilitate their eye for detail 8. let them use their whole body. However, little research is as yet available about the influences which physical objects can have on the social and emotional everyday life of autistic children. Literature does describe so called “transitional objects”: objects that a child can use to provide psychological comfort, especially in unusual or unique situations, and that can also represent relationships with others (Holmes, 2011), but this has not yet been applied in design.

We conceptualized a support as a soft, nonthreatening, inviting, and above all, passive object inviting touch while also exercising restraint (Boess et al., 2017). I briefly reiterate the interaction possibilities of the object here, as an illustration of a design for self-inclusion:

Fuzzy Bird is a fuzzy, cuddly, and soft baby bird. The instantiation was chosen for its huggable round shape with little definition and few but distinct movements (flapping little wings). The overall appearance and feel of Fuzzy Bird passively invite interaction, thereby exercising restraint and providing the reward of touch. An initially stressed child can squeeze and hug Fuzzy Bird ruggedly or even throw it about, absorbing initial anxiety or distress and involving the whole body. The simple responses gradually convey structure. Once calmer, or if the child is already calm, Fuzzy Bird offers three direct, predictable, and minimal responses, each discoverable by touch and depending on the first move from the child, thus facilitating a feeling of control. This enables the child to create structure of its own and discover the object's response without overload. These are Fuzzy Bird's responses: its wings sport colored patches, one green and one pink; on its belly, there is a yellow patch. A child can squeeze or hit the patches. If Fuzzy Bird's green or pink wing is squeezed, its head tilts to that side and a green or pink LED light up on the belly. The yellow patch on the belly also lights up on touch, and Fuzzy Bird shakes its head left and right gently (Figure 1). Fuzzy Bird responds to each action with only one direct, simple response, which in turn invites a direct, simple response from the child.

Fuzzy Bird mirrors and takes on the child's actions, but no longer its distress, and invites mirroring in turn, with subtle guidance toward calm. (Boess et al, 2017).

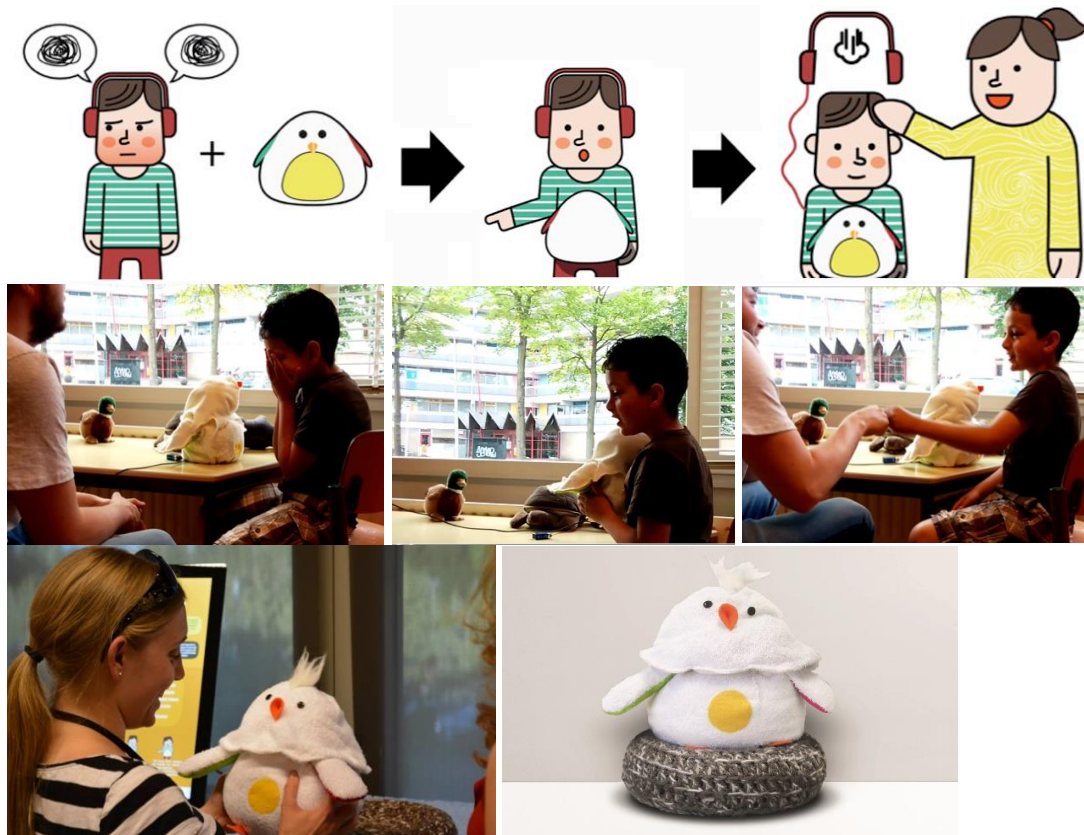


Figure 1, top row: overview of Fuzzy Bird's interaction possibilities. Middle row: a child initially closed, interacting with Fuzzy Bird, then opening up to social interaction. The child's experience may become calm and structured enough to be able to cope without headphones more often. Bottom row: the Fuzzy Bird prototype.

This case only presents the finished outcome of the design process. The process was described earlier (Boess et al, 2017), and it is less interesting here because it followed a familiar user needs elicitation process alternating with design steps. The uniqueness of the case lies in what the design outcome demonstrates: that Inclusive Design could mean designing something that readies a person for social self-inclusion. The design does not appeal to a mainstream. Rather, the design provides a service that strengthens its user and increases that person's resilience and competence in the social interactions they will encounter.

4 Case 2: supporting people in developing directions for self-inclusion

This case, in contrast to Case 1, does not present a finished design object but rather the early steps towards a design concept and stakeholder action plan. With this case, we turn to the methods aspect of designing for emotional capability. The case took its starting point in Microsoft's Inclusive Design Toolkit (Microsoft, 2015) to compare different situations of disablement, and then explored new avenues by focusing on the experiential aspect of these situations. The MS toolkit recognises that disablement arises from mismatched human interactions in a context, rather than from personal health conditions. The toolkit distinguishes between enduring, temporary or situational disablement in specific situations and interactions (Figure 2). In order to make a comparison as advised in the toolkit, the designers collaborated with two participants.

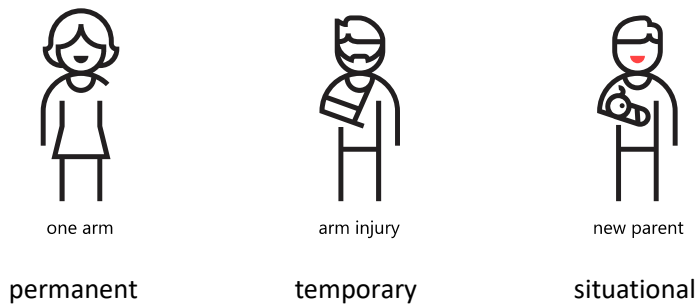


Figure 2: continuum of situations of persona disablement (Microsoft, 2015)

The first participant was a wheelchair user, I will call her Iris, who challenged us to design something that would help her enter houses without bringing in dirt from the wheels. The problem she experienced was that if the weather was bad, she would always leave traces of dirt with her wheelchair in the entranceway of the house or building she visited. Her request was a functional one: design something practical to help me clean my wheelchair wheels when I enter someone's house. Because this project could only cover initial steps, this was transformed into: elicit the need in the context and for this stakeholder.

For comparison, the team recruited a second person I will call Marian. She is a young woman, an expert snowboarder, who had recently had a snowboarding accident and then an operation on her leg. Her disablement was temporary and she expected to return to full health, but at present she was unable to run or walk fast. Since wheels play no role here, she and the design team focused on the situation of an arriving train stopping far away down the platform and having to reach it on foot.

The design research team developed a tool to elicit each participant's experience of their situation. The tool focused on the character of all the actors in the situation (people and things), and on identifying the intent of each of these actors (Figure 3).



Figure 3: Examples of "character" cards and "intent" cards. The example character cards here describe a "bystander", "no one", and "a friend". The example "intent" cards describe "being friendly", "helping", and "wanting to get away". Twelve of each were presented in the session, with the option of adding more.

Additionally, the tool contained a 'playing board' on which the intentions of these characters could be noted, and then ideas noted during the enacting and reflecting phases on emotions in the situation and on desired future interactions.

Each of the participants, was invited to participate in one session of ca. 1.5 hours' duration. The sessions served to facilitate the participant in envisaging their present situation and its social interactions, and then to formulate a desirable future situation with new social interactions. The

purpose of this was that in a potential next step, the participant could collaborate with the designers in sketching design interventions that would support the desired new situation.

4.1 *Session steps*

Each session consisted of six steps. The design team prepared those steps in order to guide the participant through them. The first three steps related to their **current** situation. The participant was first asked to **immerse** in the current situation – the participant was asked to reflect on a current interaction of their choosing with things and people in the actual environment in which these interactions take place. This served to enable them to bring realism, social aspects and embodiment into the session. Step 1 was to **make** the current situation – when the participant arrived for the session, props and story tools were available so that the participant could re-create that real-life situation in the studio setting. The sequence of current interactions was noted on a large board evocative of a game board, to represent and analyse the sequence of the interaction. The next step was to **reflect** on the current situation – the participants were then given a set of cards to represent the character of those involved, as well as the intent of each of those involved. These three steps could be repeated and adapted flexibly. When a participant had reflected on the situation, they had the opportunity to **immerse** in it again, for example by enacting it to remember and discover new aspects, or to **make** new parts of it from memory. Once these situations had been enacted and the role of all actors in the situation analysed, the participant was invited to move towards creating a desirable **future** situation. This would start with the designers supporting a participant in **making** parts of a desirable situation by using props and re-arranging the actors and their characters and intentions. Then the participant could **immerse** in the situation by enacting it and experiencing its effects in an embodied way. This provided a basis for **reflection** on the situation and its effects for the participant. Again, these three steps could be repeated and adapted flexibly to discover new aspects or to change the situation in a way they pleased.

4.2 *Results of the Case 2 sessions*

Iris who is permanently in a wheelchair, it turned out, hated being helped. She had a great deal of pride in her full professional life and in her ability to live and drive herself around independently. She rejected any notion that social interaction could play any role in the solution space. However, when she was asked to also give the objects involved a character and an intention, valuable insights emerged.

The tools revealed that she viewed the interaction of entering her sister's house as one of *mutual* helping, characterised by love and the mutual will to offer a service. She had a ritual of collaborating with her sister in this activity: Iris would bring in a mat that she always keeps in the back of her car, her sister would roll out the mat for her, she would ride a pattern on it in her wheelchair, and the mat would then stay rolled up in her sister's hall during her visit. They were a team in carrying out this action. (Figure 4).

However, when it came to visiting others, Iris felt very differently: that she would rather not visit others than having to receive their help with this. The cards she chose to describe her feelings about the eventuality of this situation were 'victim' and 'egotist'. Such a situation would make her feel both that she would impose too much on others, and that she would feel and be seen as a victim. She commented that 'people think they have to think for someone in a wheelchair'. This was the reason she wanted a design that would put the activity of cleaning her wheels under and within her control. For the future situation, whatever she would then have would have these characteristics: facilitate optimal human respect from others, being able to always clean her wheels when desired, cleaning the wheels being a natural *part* of entering any building just as one would have with shoes, with the action being spontaneous, reassured, and based on free choice. The provision could appear strange when first introduced, but it should then be capable of becoming normal, just like cleaning shoes. The session did not become more specific than this, but these points illustrate well how requirements for inclusive design could be based on experiential insights. Given the delicate

experiential positioning of the design direction, Iris (or others with similar experience) would clearly need to stay involved in next design steps.

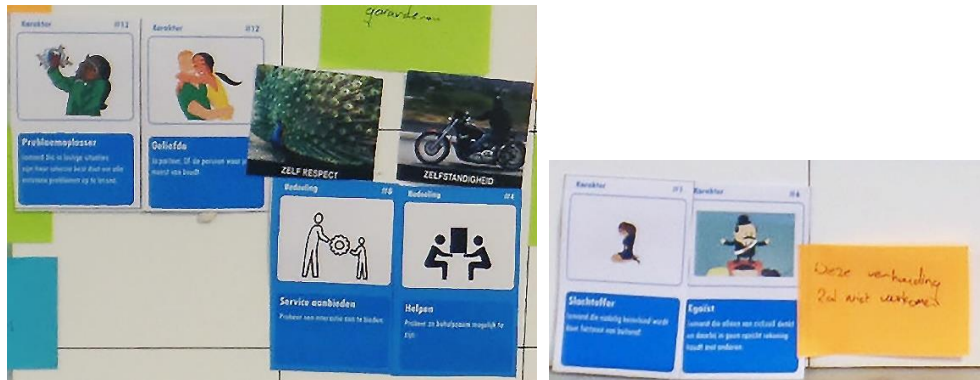


Figure 4: Iris' session cards. In her current situation with her sister, all were characterised as "problem solvers" and "bound by love". Their intentions were to "offer service" and to "help", in an emotional situation of self-respect and autonomy. By contrast, the situation in which Iris would visit strangers, would lead to her perceiving herself as a "victim" and an "egotist", which she precluded by saying "such a situation would never happen".

In the second session, Marian who had a temporary and invisible impairment with her knee, enacted the situation of an arriving train stopping far away down the platform and having to get to it. In this situation were also involved the train conductor and a fellow passenger. In the enactment of the present situation, Marian experienced herself as a 'no one' and a 'victim' (by selecting those cards). She experienced the conductor as a 'fool' and her fellow passengers as 'selfish people', and all others together as 'in a hurry'. Marian saw her own intent as 'being polite', but that of the others as 'wanting to leave'. Immersing by enacting this scenario revealed her experiences, which she described upon reflection as feeling ignored and feeling guilt about imposing on others. Continuing on to create and enact a desirable future situation, Marian characterised herself as 'innocent' - a similar wish to Iris' earlier wish for 'normality' – the train conductor as 'a good samaritan', and a fellow passenger as a 'hero'. In this situation, the conductor would immediately be aware of and understand Marian's inability to walk fast towards the train and urge other passengers to help Marian get to the train. The others' intentions would be to be 'responsive' and 'polite'. This session too ended at this stage, with experiential insights that could inform requirements. Here too, next steps should be undertaken with Marian's involvement.

The two participants' situations were both described here in order to highlight the differences in experience between someone who is an expert at their situation, having lived with a permanent disability for a long time, and someone for whom their temporary disability is unexpected and surprising. The differences found were: visible versus invisible disability, very experienced and goal-directed versus rather thrown by daily life interactions and as a consequence of these differences, rejecting versus hoping to get offered help. This highlighted how different the experiences between permanent and temporary disability can be. However, for both of them, design solutions might be preferable to the help of strangers. Although Marian was much more open towards it, she also felt guilt. The Microsoft Inclusive Design Toolkit notes that "We use a persona spectrum to understand related limitations across a spectrum of permanent, temporary, and situational disabilities. It is a quick tool to help foster empathy and to show how a solution scales to a broader audience." The cases presented here had different contexts and therefore no conclusions about scaling could be drawn, but they did show that both would benefit from design solutions. However, they also showed how different their starting points were, and that designs would have to take into account that someone might be disoriented and overwhelmed by a new situation and focused on their own predicament, whereas someone else might be very goal-directed, focused on practical solutions with low acceptance of human involvement, and already have considered the broader application of potential designs.

5 Discussion

The results section has presented two cases that elucidate the emotional aspect of dis- enablement. The cases differ in that the first one focuses on emotions as a part of the disability itself, and presented a design to address them in order to promote self-inclusion. The second one focused on physical disabilities and the attendant emotional experiences and how they hold potential for design directions. I propose an approach within inclusive design that is focused on the experience of situations rather than mainly physical disability. In the first case, the physical aspect comes into the situation as a positive contribution. Facilitating hugging and predictability as a conduit towards learning social interaction skills, corresponds to Clarkson and Langdon's (2014) observation of how one capability can support another. The second case highlights the emotional aspects of a physical disablement, and particularly the differences and similarities arising from differences in level of experience with the disability. I add to the inclusive design literature a focus on the design potential arising from the emotional and broader psychosocial insights from combined embodiment and participatory design activities. Although one of the cases is presented through the example of a design outcome, this is not the key contribution of this paper. For example, in contrast, Heylighen & Bianchin (2013) argued that inclusive design and good design matched when all critics could agree on the quality of the outcome. Here, the outcome itself is not the focus but rather how the outcome (first case) and the method (second case) engage with a person's emotional self-inclusion and contextual emotions.

The findings in our Case 2 are closer to Desmet & Dijkhuis' (2003) analysis of children's needs for their wheelchair than to the inclusive design literature. Their research had found that feeling and looking independent was one of their most important concerns. The case of Iris showed a very similar result, though for someone who was a seasoned, independent professional. Because of the level of her experience, however, she was able to not only pinpoint this, but also provide ideas of how her situation should be generalised. In addition, our more general method (not specifically focused on wheelchair design as yet) delivered a number of possible points of entry, such as doorway design, accessory design or wheelchair design. The findings also echo those of Stenberg et al (2016) study into the user perspective of wheelchair users, who found that practical, personal and social dimensions were intertwined and significantly involved. Our findings provide a follow-up to those findings by providing various contextual entry points for design. I have shown how an embodied, contextual approach similar to that advocated by van Dijk & Verhoeven (2016), can achieve this.

An often-cited goal of inclusive design is to mainstream consideration of different ranges of capabilities and thus accessibility of products, aiming their arguments at companies and the potential to achieve market and brand advantage (Clarkson & Coleman, 2015, p. 2). Annemans et al (2014) provided a perspective aimed more at designers' sensibilities, advocating designing for a person rather than for a patient. Taking up Ostuzzi et al's (2017) finding that a 'Design for the one' can be generalised and applied on a broader scale, we can ask whether our approach, featured here, can do this as well. I suggest that Fuzzy Bird, designed with a focus on children diagnosed with autism, can be applied on a broader scale. Not only an autistic child like Tommy could benefit from a design promoting self-inclusion, but also a generally very shy child or a child who is nervous for his first day at school. My main specialism is not the theoretical field of emotional design but rather participatory and inclusive design. What this paper contributes to the field of inclusive design is the further exploration of the 'emotional dimension' within the inclusive design field just as it has begun to be explored in Langdon et al, 2014, by adding the emotional capability to the three capabilities relevant to inclusive design in the model by Clarkson & Coleman (2015). We have seen, for example, that Iris has compensated her physical disability with depth of emotional understanding of wheelchair use. What this means for the model has not yet been defined, but this design case suggests that further development of the model could broaden the field of inclusive design. It would be valuable to develop a more structured inclusion of the emotional domain in the inclusive design

field so that these fields can also be integrated for the mainstreaming efforts as sketched by Clarkson & Coleman (2015).

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