Chapter 1

Together Through Play: Facilitating Inclusive Play through Participatory Design

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1.1 Introduction

Play has an important role in the development of physical and social skills of children (Piaget, 1929), and is recognised as a fundamental human right (cf Article 31 of the United Nations Convention on the Rights of the Child). Disabled children face many barriers to play, which can be due to accessibility, but also to social barriers that arise between disabled and non-disabled children (such as ableist assumptions or sensibilities held by non-disabled children) - which are exacerbated by the difficulties of playing together.

There is a growing move towards inclusive education, encouraging the inclusion of disabled children into mainstream schools, rather than being educated separately. To be truly inclusive, such education must fully involve disabled children in all aspects of school life, including being able to play socially with their peers (cf http://inclusiveschools.org/inclusion-on-the-playground/). For play to be effective, it must be meaningful: it is not sufficient to have disabled and non-disabled children playing next to each other. They must be engaging in a way that is meaningful to both. If disabled children are denied the opportunity to engage meaningfully with others, they remain effectively excluded as well as being denied the opportunity to develop skills and exercise agency (Burke, 2012).

This paper describes a participatory design project between Engineers and Sociologists at the University of Leeds that explores the aspirations of disabled and non-disabled children for playing together and barriers that prevent this. The project takes a co-operative enquiry approach (Druin, 1998), as a way of attaining a richer understanding of children's views. The aim is not to develop inclusive toys per se, but to use the toys designed and prototyped as critical objects to provide insight into children's views. This paper reviews current literature on inclusive play, describes the participatory design process used, then reviews the initial findings from this process and reflects on our experiences, including the distinction between accessibility and inclusivity in play, the role of social barriers and how these can be addressed through the design of toys and games.

The language used in this article is in keeping with the Social Model of Disability (Oliver and Barnes, 2010), which views *impairment* as a property of the body and *disability* as a social relationship. According to this model, disabled people are people who have impairments, but are disabled by society. The model has not been without its critics (Allan, 2010). Elsewhere Beckett (2006) has argued that the model may need to be revised to ensure that both impairment and disability are understood within a social framework. Nevertheless, it represents an important alternative to the Individual Model of Disability which views the 'problem' of disability as residing solely within the bodies of disabled individuals (Oliver, 1990). It is a heuristic device that helps us to think differently about disability.

1.2 Inclusive Play

In recent years, campaigns by disabled people's organizations such as 'Disability Equality in Education' (http://www.diseed.org.uk) and the 'Alliance for Inclusive Education' (http://www.allfie.org.uk) have brought a shift towards inclusive education in the UK. As a result of the the Special Educational Needs and Disability Act (2001) there is now greater representation of disabled children in mainstream schools in the UK. Inclusion is, however, about more than simply 'integrating' disabled children into the physical environment of the mainstream classroom; it is also about ensuring that schools and classrooms become 'inclusive' environments in their values and ethos (Barton and Armstrong, 2007).

Play is an important aspect of this integration or inclusion - where children are not able to play *meaningfully* together, they cannot be said to be truly included. A range of efforts have been made in terms of making toys and environments accessible to children with impairments, though these have generally focussed upon outdoor play areas (e.g. www.inclusiveplay.com). Endicott *et al.* (2010) have adapted the Principles of Universal Design to develop guidelines for the design of inclusive playthings and environments, and undertaken some comparisons of the differences in the way that disabled and non-disabled children play (Endicott *et al*., 2009). However, the emphasis remains on making play accessible to children – which is not the same as ensuring that children are included in play. Instead, this implies a social aspect, a willingness for disabled and non-disabled children to play together in a way that is meaningful to both. The challenges experienced by disabled children are not merely those of accessibility: their lack of power makes them more vulnerable to the views of soceity, which encourage low self esteem and 'internalised oppression' (Reeve, 2004). This project places an emphasis on the social and emotional aspects which make play opportunities *meaningful* to children (Golinkoff, et al., 2006). For this project, meaningful play is play that allows children to establish friendships, have positive interactions with peers and others; empowers disabled children, challenging processes that lead to internalised oppression (ableism); challenges perceptions about impairment/disability and any ableist assumptions held by non-disabled children.

There is some evidence that increased contact between disabled and non-disabled children have a positive effect on attitudes between them (Maras and

Brown, 1996); but also evidence that increased interaction with disabled peers can increase negative attitudes (Hodkinson, 2007). Despite general agreement within Disability Studies that negative attitudes towards disabled people – often termed 'disabling attitudes' - are a significant problem, little *empirical* research, informed by Disability Studies perspectives, has been conducted to explore these attitudes, especially as they are held/articulated by children. There is much *theorizing* about disabling attitudes. Authors within Disability Studies have mostly rejected the traditional 'psychological' approaches which tend to view attitudes as formed by individuals in isolation (Howarth 2006), rather considering that ideas about disabled people to take shape 'in interaction, in dialogue and in practice with others' and to be 'anchored in traditions and ideologies' (Howarth 2006, 695).

Play is an example of just this sort of 'interaction, dialogue and practice' and we should be concerned about the way this is taking place within lay situations, lest it reinforce disabling attitudes. Play provides an opportunity for children (disabled and non-disabled) to form positive ideas about disabled people. Our study seeks to find new ways to address this type of problem. Can play help to challenge these attitudes and assumptions? In this project, participatory design, prototyping and testing are the vehicles for exploring this question.

1.3 Participatory Design Process

The challenges of doing research with children and designing with children are well-documented (Markopoulos, 2008), not least because of the traditional power relationship between adults and children. Druin (1998) proposed the concept of cooperative inquiry: participatory design with children not as a way of generating great designs, but as a way of better understanding their views. Researchers on the project are working with groups of disabled and non-disabled children to develop and evaluate designs. The aim of the project is not to design inclusive toys and games per se, but to identify children's aspirations for playing together, the barriers that prevent this, and how they might be overcome.

The project has adopted a series of iterative cycles:

1. Initial group interviews with children about the experience of play;
2. Working with children to develop initial concepts;
3. Building lo-fidelity prototypes to illustrate game concepts for evaluation;
4. Revising the concepts based on feedback, and developing hi-fidelity prototypes that children can use to play;
5. Selection and refinement of two most preferred concepts, for final evaluation with children.

In this way, we not only explore their ideas, but also test them out. It is important to understand the reasoning behind comments and preferences, and to explore them more deeply. Design and evaluation sessions were recorded for detailed coding and analysis, in exactly the same way as the interviews, with the prototypes becoming a probe for prompting discussion.

Twenty-two children at four schools are participating in the project in the 7 to 10 age range. The six disabled children recruited to take part in the project have

physical impairments relating to cerebral palsy (for four of the children), hearing impairment (deafness) and dyspraxia. Children were recruited at the discretion of the school in small friendship groups varying between three to six children in size, such that at least one child in each group had a recognised impairment, and at least one did not. Clearly, there are a huge range of potential impairments, and it would be impossible to systematically cover their full distribution. The scope of this project was limited to physical impairments, and the sample is in many ways a convenience sample taken mainly from schools who have worked with the University previously. The aim was to conduct an exploratory study to identify children's views, rather than to conduct a systematic and representative study. At the time of writing, data gathering for the first four stages have been completed and it is the outcomes of these that are reported in the next section.

1.4 Results

This section reviews the work completed at the time of writing, and the initial findings of the project. It is worth noting that a detailed analysis of the interviews and feedback sessions which will offer a richer interpretation of children's attitudes towards play and inclusivity is still underway, and will only be completed once testing with the finalised prototypes is complete. The results presented here describe the design outcomes, and our main observations from testing.

1.4.1 Initial Interviews

Semi-structured group interviews were conducted with each friendship group, to identify their preferences for play, and any experiences they had of exclusion from play. In addition, the children were asked to brainstorm ideas for games which disabled and non-disabled children could play together. There was no expectation that the children's designs would be potential solutions (though if they were, so much the better) – rather, they provide a further source of data about their play preferences, and their attitudes towards impairment and disability.

The disabled children were able to give several examples of being excluded from play as a result of impairments. Being physically slower and the preconceptions of other children were both identified as issues, and for child with a impaired hearing, difficulty in understanding the game being played and having to ask for help or clarification were major barriers to playing with other children. Among the children more generally, age was identified as a major factor, with older children excluding younger children, particularly siblings, and more popular children excluding those they perceived as being less popular. It was also noted that such exclusion could be extremely mean, with some children noting the insults used to drive away excluded children, and some explicitly characterising it as bullying, and noting how upsetting this exclusion could be for the child involved.

Unfairness and excessive dominance were particular problems. Children disliked it when one or more children "took over" and "Spoil[ed] a game", leaving

the other children feeling left out. Dishonesty was also seen as something that spoiled play, and children indicated that they tended to avoid playing with children who they thought wouldn't play fair. All the children reported that they strongly disliked falling out with friends over games, and that this was the thing they most disliked about play. It was noted, however, that sometimes children just had different aspirations for play, and that children may decide not to play because the group as a whole was not playing the game they wanted.

Lack of confidence was also noted as a potential cause of exclusion, with children feeling unable to approach groups to join in, or not wanting to participate in a game that they didn't feel they were sufficiently good at. It was also noted that children tended to want to play with children of similar ability. Team sizes were also noted as problematic, with children citing a range of games from Rugby to Connect 4 as problematic because only so many children could play, meaning that any other children were automatically left out. Being perceived as different was also seen as problematic, and it was noted that children who had to rely on a parent lot, often felt left out when playing in public spaces, where other children could gravitate towards each other and play together.

Children's designs demonstrated a tendency to be derivations of existing games, particularly videogames such as SingStar™, Minecraft and Call of Duty (despite the last of these being rated as unsuitable for children). One group designed a piece of outdoor play equipment called the *Fort of Doom*, and devised an elaborate series of games around it, though they did indicate that they would also be happy for it to be a videogame. Customisability and collectability also featured prominently, with references to toys such as Moshi Monsters™. In terms of the accessibility of the games, the non-disabled children tended to opt for a system whereby disabled children would be given more turns, or a golf-style handicap, because they "wouldn't be as good". Some of the disabled children expressed a desire for games that could be quite physically challenging – for example, one child with impaired arm function due to cerebral palsy designed a game based around solving puzzles which required quite fine dexterity, because this was the sort of game he wanted to play. Notably, however, he stipulated that the game should be playable one-handed, allowing him to use his unimpaired arm, and removing the key barrier to his participation.

1.4.2 Concepts and Low Fidelity Prototyping

Based on the children's initial ideas, five game concepts were developed in conjunction with a team of undergraduate Product Design students at the University of Leeds. These concepts drew upon the concepts developed by the children for inspiration, though considerable adaptation was required to ensure they conformed as far as possible to Endicott *et al.*'s (2009) adaptation of the Universal Design Guidelines, and some ideas were merged. The aim was to design specifically for the tastes and capabilities of the 22 children participating, and whose aspirations we were exploring, rather than trying to create truly universal toys. *3D Stack* engaged children in the task of building a tower from shaped blocks, with the aim of building the highest tower possible; *Jump On* was a

videogame controlled by pressing buttons on a mat, such that children could steer a hovercraft in the game by moving around the mat to change the balance of the craft in the game; *Battle Balls* was a modern spin on conkers, using larger "monster" heads with the aim of striking the opponent's target area and detaching them from their string; *Escape the Castle* was an educational board game, in which the children would move around a board and carry out asks related to different subjects (Maths, Art, etc.) in order to escape from the fictional castle as a team; and *Puzzled* presented a 2 player memory game, in which one player would press out a sequence of buttons, causing lights to flash on the other player's side of the board, and the other player would have to reproduce the sequence within a time limit. Low fidelity models were produced, as shown in Figure 1, and these were taken into schools for discussion. The prototypes were not functional, although it was possible to simulate play with them: their purpose was to help communicate the ideas to the children for discussion before they were developed further, rather than for practical testing. In this they were quite effective, though children struggled to imagine some of the functions and this was reflected in their feedback. The children were generally positive about the games (although it should be noted that children show a bias towards positive feedback (cf Markopoulos *et al.* 2008)).

Figure 1.1 Low Fidelity Prototypes a) Jump on; b) 3D Stack; c) Battle Balls; d) Escape the Castle; e) Puzzled.

Children were keen to have a team-based approach in *3D Stack*, with two teams competing with their own pieces to build the highest tower, each within its own footprint. The teams should also be multiplayer: "games are more fun when you can include more people". A time limit was also a popular suggestion, though there was a lot of disagreement about how long it should be, suggestions ranging from 5 minutes to half an hour. Alternative suggestions for names were also proposed: "Stackamo" or "Stackcraft" (in honour of Minecraft) were popular choices.

Jump On was popular for the fact that it involved a videogame, and the idea of collaborating to steer a vehicle was a popular one – but the mode of interaction did not work well. Children did not like having to sit in such close proximity, and some of the disabled children found sitting or reaching to the side particularly difficult, noting that it would be better if the layout of controls was more flexible.

The children had a lot of fun with *Battle Balls*, but found that the strings tended to get tangled, and the children with arm impairments found it difficult to use the low fidelity prototypes, because by their nature they were bi-manual (one hand to hold the string, and one hand to aim and fire). They suggested that it would be good to have a more rigid wire, to make them easier to use. It was also suggested that the characters should look more monstrous: the boys in particular were concerned that the Battle Balls looked too cute and colourful.

Escape the Castle was less popular because of its educational aspect, and it was felt that the castle did not look spooky enough. The children also complained that they were moving around the castle rather than escaping from it. The children enjoyed the mix of activities, but this depended on their abilities – the children who were less good at maths, for example, disliked having to do maths questions.

Puzzled was also one of the less popular concepts, with some children being keen (particularly those who had suggested this idea in the first place), but other children were concerned that it was quite boring, or that the child setting the pattern might deliberately make it too difficult for the other child.

Children were particularly interested in how these games were based on their ideas, and some asked if they would be able to make their own prototypes. On the whole, though, they were very keen on being consulted about design decisions: "Can I say something? In my head I feel like I'm in this grown up meeting, deciding about complicated engineering."

1.4.3 Functional Prototypes

Based on these comments, the games were refined, and functional prototypes were built to allow the children to try them out, as illustrated in Figure 2. *3D Stack* was renamed *Stackamo* at the children's suggestion, and the static board was replaced with a set of LEDs that could light up in blue or green, giving separate footprints for two teams to build their own towers with the appropriate coloured blocks. *Battle Balls* were refined with more monstrous faces, a strap in place of a string (to avoid tangling and encourage a straighter trajectory) and a grip that allowed attachment to a table or forearm, rather than just being held in the hand. *Escape the Castle* was renamed *Escape the Fort of Doom!* at the children's suggestion.The board was redesigned to be more "scary" and it was made clearer that players would be heading towards the exit. *Puzzled* was given a "crazy crows" theme, based around crows raiding a cabbage patch, in order to make it more visually interesting, and was implemented as a computer game using National Instruments' LabVIEW™ on a tablet computer, with a physical dividing screen to separate the two halves.

Jump On was the only concept to be significantly altered due to feedback on the low fidelity prototype. The mat concept was abandoned in favour of the use of

tactile switches (similar to the Tash Buddy Button), the game again being implemented using National Instruments' LabVIEW™. The game moved away from the concept of steering, to a game closer to wackamole, where each player had to press their button when the relevant colour of alien popped up. Each player was given a score, and the team accumulated a score as a whole.

Figure 1.2 Functional Protoytpes of a) Stackamo; b) Button Bash; c) Battle Balls; d) Escape the Fort of Doom!; and e) Puzzled: Crazy Crows.

The children were given the opportunity to play with the prototypes, and were given a vote on which they would most like to see developed. *Button Bash* and *Battle Balls* came out as the two most popular, followed by *Stackamo*, and then *Escape the Fort of Doom!*, with *Puzzled* being the least popular. The *Escape the Fort of Doom!* theme was popular, but some children did request that it should be a videogame, rather than a board game.

The physical accessibility of the prototypes were good, with the exception of the mechanism for reattaching the *Battle Balls* after they had been triggered, which required significant manual dexterity and proved problematic for the children for whom this was impaired.

Most significantly, the alterations made in transforming *Jump On* into *Button Bash* may have improved its physical accessibility, but the alterations were not all positive. The inclusion of individual scores meant that there was immediately an element of competition between the children, with some complaints that the game was "unfair" because one player got more aliens presented to them than another (even though this was factually incorrect!). Some children felt frustrated if they were not able to get what they perceived as a good enough score). Most significantly, the limited number of buttons meant that not every child could play.

One thing that was observed was that where only a limited number of players could participate in a game, social pecking orders asserted themselves, and the disabled children tended to be at the back of the queue, meaning that while they were physically able to play the games, they were still socially excluded until the research team intervened. Where there was space for everyone to play (the team-

based approaches to *Stackamo* and *Escape the Fort of Doom!* for example), this did not happen, although in some cases there were some unpleasant arguments of the form "I'm not being a team with him/her!", vividly demonstrating the sort of unpleasant behaviour children had mentioned in the interviews.

Interestingly, *Battle Balls* – which was both two player and competitive – did not seem to experience this problem. Our interpretation is that this was because games were quick, and there were enough resources for everyone to have a Battle Ball, and so take turns to compete. It was also quite an effective spectator sport, with children cheering each other on and getting quite involved even when they were not playing. By comparison, computer-based games such as *Puzzled* and *Button Bash* were generally watched in silence.

1.5 Conclusions and Further Work

This paper has provided an overview of the work carried out on this project to date, and our main observations. The main lessons to come from this are the significance of social barriers as well as physical barriers to inclusion: that is, a game may be accessible, yet the behaviour of the players determines whether or not it is inclusive. It seems that these social barriers may arise (or could be ameliorated) through better design – such as allowing variability in the number of players and encouraging collaboration rather than competition. Of course, this then raises the question of whether avoiding competition is a healthy approach, or whether there may be ways of encouraging more "constructive" competition.

The final step of prototyping has yet to be undertaken: both *Battle Balls* and *Button Bash* will be further refined based on feedback from the functional prototypes and taken back to the children for further evaluation. In *Battle Balls*, the trigger mechanism will be refined to ensure easier reattachement. *Button Bash* will again be extensively redesigned, to accommodate a variable number of players, to emphasise a more co-operative playing style, without individual scores, and to adopt the *Escape the Fort of Doom!* theme. This will allow us to assess whether these are able to mitigate the social barriers that arose through the design in the functional prototype testing.

It is also worth noting that the detailed coding and analysis of the interviews and prototype testing have yet to be conducted. These have provided a very rich source of data which is now being complemented by data gathered from teachers and parents on inclusive play. It is through the analysis of these that we will be better able to grasp whether inclusive play offers the opportunity to encourage the development of positive attitudes between disabled and non-disabled children.

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