Designing for Attention Deficit Hyperactivity Disorder in Play Therapy: the case of Magic Land

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ABSTRACT

We report on Magic Land, a package of play activities on an interactive tabletop, designed to support non-directive play therapy with children. In our use-case we discuss children suffering symptoms of Attention Deficit Hyperactivity Disorder. Drawing on this experience we speculate on design guidelines for systems that aim to support children experiencing problems with memory, concentration and attention in play therapy.

Author Keywords

Play therapy; cognitive limitations; design; children.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Digital technology is a familiar media in children's lives. Video games and virtual reality applications in particular have already been successfully deployed in psychotherapy to treat a range of anxiety, panic disorders and phobias [3]. Digital technologies, however, are largely absent in non-directive therapies with young children. Therapists are concerned that technology may interrupt child/therapist relationship and frustrate the child, if not working properly. Yet, there is little evidence that supports these concerns.

Interactive tabletops constitute a new generation of digital technology that allows for direct interaction through a horizontal multi-touch surface. They have been used to promote children's fantasy play, storytelling, creativity, and collaborative interaction [5]. Although play therapy is based upon these elements, there is little research on the use of interactive tabletops in play therapy.

In this paper we present Magic Land, a package of play activities designed for the use with primary school children in non-directive play therapy. We further discuss a case of the use of Magic Land with two children, who in addition to emotional problems were diagnosed with Attention Deficit

Hyperactivity Disorder (ADHD) suffering difficulties with memory and concentration. The overview of the encountered problems is given. Finally, we speculate on how design systems that are aligned with play therapy principles and, at the same time, support children with cognitive limitations by guiding their technology use.

Figure 1. The *Magic Land* interactive tabletop prototype

PLAY THERAPY

Play therapy is defined as a form of self-therapy for children through which confusion, anxieties and conflicts are worked through [4]. Since children's language development lags behind their emotional and abstract abilities to conceptualize the world in which they live [2], toys and other manipulative tangibles are used in play therapy as a way of helping children communicate their ideas and feelings. Play therapy can be used with any child to help them modify their behaviors, clarify self-concepts and build healthy relationships. In simple terms we can think of it as equivalent to what counseling is for adults [6].

Non-directive Approach to Play Therapy

Non-directive play therapy is based on the belief that within each person is a powerful force that strives for complete self-realization [2]. This is manifested in each individual's desire to gain maturity, independence and self-direction. Therefore, in non-directive play therapy it is essential to create space for the child to have full freedom to lead and control the therapeutic process without the therapist providing any direction or guidance.

To facilitate the therapeutic process, however, the therapist is required to establish warm and friendly relationship; unconditional acceptance of the child; opportunity for the child to express feelings without fear; reflection of feelings back to the child; returning responsibility to the child; letting the child lead; recognition of the gradual nature of therapeutic process; setting of only necessary limits [2].

Use of Non-Directive Play Therapy
Non-directive play therapy has been shown to be an effective intervention for children with a number of problems including anxiety, depression, medical illness, post-traumatic stress disorder and attachment problems [8]. In addition, it is successfully used with children suffering autism, mental retardation and Attention Deficit Hyperactivity Disorder (ADHD) [8]. Non-directive play therapy is an effective intervention to improve relationships, self-concept and feeling of frustration [10].

ATTENTION DEFICIT HYPERACTIVITY DISORDER
Attention Deficit Hyperactivity Disorder is a condition usually developed in early childhood that is characterized by significant problems with attention, impulsiveness and excessive activity [1]. The number of symptoms can be broadly divided into three categories: inattention, impulsivity and hyperactivity.

Inattention symptoms include the child's inability to finish the task, difficulty concentrating or sticking to one activity, failure to listen and follow what is being said. Impulsivity is being observed when the child acts before giving it a thought; has difficulty organizing his time and work; needs a lot of supervision; has difficulties awaiting turns in games. Running about or climbing on things excessively, difficulty staying seated, and being always 'on the go' are signs of hyperactivity. Children with ADHD symptoms can be described as excessively emotional, often experiencing anxiety and behavioral problems [1].

MAGIC LAND
Magic Land (Figure 1) consists of four toys implemented as an integrated suite of multi-touch applications on a SMART Table: *Flying Feathers* to support creative and emotional expression, *Rosebush* to support storytelling, *Hero/Avatars* to support fantasy play and *Water* to support new play opportunities. (Full description of Magic Land design and evaluation can be found in [7]). A child can open each specific toy from the "home" screen by pressing on an image that represents the toy. An exit button on the right top corner of the screen allows the child to return to "home" at any time.

In contrast to a lot of commercial children's video games, the application is designed as a non-goal oriented virtual environment where the child has freedom to choose among such activities as drawing; mixing colors; using background pictures and characters; options to create a hero or an avatar; play with fire, water, snowflakes and rain.

Flying Feathers: Supporting Expression
Flying Feathers responds to non-directive play therapy principles of *Unconditional Acceptance and Feeling of Permissiveness to Express Anything* by supporting a child's creative expression through painting, drawing, mixing colours and creating scenes in picture frames. These options allow the child to make art in the presence of the therapist, which enables a child to connect with their feelings and particularly those that cannot be easily expressed in words [9]. We provided a wide palette so the child could identify with and express a broad range of feelings.

Rosebush: Supporting Role-Play
Following a non-directive approach *Rosebush* supports role-play, evoking a *Feeling of Permissiveness to Express Anything*, another core principle of non-directive play therapy. In this toy, images of trees, flowers and animals become the child's language, allowing a child to create environments and stories and, thus, to explore understandings and feelings of real life events.

Hero/Avatar: Supporting Imaginative Play
Hero/Avatar supports the child's creative expression and imaginative play. To support *Feeling of Permissiveness to Express Anything* it is valuable to empower the child through imaginative creative play with avatars and superheroes. Rather than providing a set of already made famous superheroes (e.g. Batman or Wonder woman) Hero/Avatars encourages further creativity by enabling the child to create their own hero.

Water: Supporting New Play Opportunities
The final application in *Magic Land*, *Water*, focuses on non-directive play therapy principle of *Returning Responsibility to the Child* by again creating opportunities for play that cannot be offered in a traditional play therapy room environment. The Water application allows the child to joyfully play with water. We created opportunities for the child to make ripples, add pebbles and various stones, ships, shells etc. We also combined it with the sounds of rain and thunder and corresponding visual effects created on the surface of the water to explore the possibility and potential benefits of bringing music and play therapy together.

CHALLENGES OF MAGIC LAND
Although the Magic Land wasn't designed specifically for the use with children suffering cognitive limitations, we present below two cases of children, who in addition to emotional problems, were diagnosed with ADHD suffering difficulties with memory and concentration (names are changed for ethical reasons).

Case 1: Mark
Mark, a 6-year-old boy diagnosed with ADHD, was referred for play therapy sessions to work through his anxiety and behavior problems. Usually, Mark found it difficult to concentrate on any activity for a definite period of time and seemed quite fearful to try new things if his first attempts failed.

The simplicity of the Magic Land interface ensured that the system could be easily used without the therapist's guidance or instructions. Mark's impulsive hand movements on the table, however, made it difficult for the system to respond appropriately which often led to 'freezing' and the need to restart the tabletop. This resulted into Mark being frustrated and discouraged from the play on the table. He would switch to using tangible toys for some time and then go back to play with the Magic land.

Mark's interest in technology served as a motivating factor that encouraged him to keep the focus on his play. His parents noted in the conversation with the therapist that playing on the interactive tabletop was the longest activity that they saw him focused on in a long time. Interestingly, Mark seemed to adjust his speed of play on the table in order to avoid problems with computer freezing. It could be due to his interest in technology and desire to play on this new medium that encouraged him to adjust his own pace.

In his sessions, Mark mainly used Flying Feathers and Water applications that were designed for creative and emotional expression. Perhaps not surprising that Rosebush and Hero/Avatar were used considerably less, compared to the children in the study, who did not have ADHD, as these applications would involve more slowly play and cognitive involvement on the child's behalf.

Case2: Jenny
Jenny, 8-year-old girl used the Magic Land in her play therapy sessions. Similarly to Mark, Jenny was diagnosed with ADHD and referred to therapy to work through her tantrum behavior and fears.

On a few occasions the therapist noted that Jenny liked Hero/Avatar and Rosebush applications the least of all. It is hard to say why she avoided creating stories and scenes. It could be possibly explained by her struggle to think abstractly to recall where the images she would need are. Also, storytelling activity requires time commitment and focus, which she found difficult: *'...I don't know if it's because she's ADHD so may be its not going fast enough for her...' (T2)*.

Jenny did a lot of explorative and expressive play using Magic Land. She would use her cheeks and ears to draw on the surface of the table. She also enjoyed playing with Water because *'...it's calming...and even the sound, you know, can make it just a little bit louder...when the sound is on [it's like] you're playing in the water' (T2)*.

In addition, the child spent much of the time re-sizing, rotating and vanishing images off the screen. It seemed that she enjoyed non-goal oriented environment of Magic Land that enabled her being in control and making her own decisions about her play.

SPECULATIONS ON DESIGN GUIDELINES
In the previous section we presented a quick overview of the children's play with Magic Land in play therapy

sessions. It seems that those two children diagnosed with ADHD engaged more with the applications designed for emotional and creative expression (Flying Feathers and Water). Hero/Avatar and Rosebush applications, designed to encourage storytelling and imaginative play, on the contrary, received much less attention from the children. In light of this, we propose two directions for the future system designs

Further Encouragement of Emotional and Creative Play
Since children with ADHD experience difficulties maintaining focus on one task and processing information as quickly and accurately as others, they may benefit more from play that enables expression of feelings and creativity in a way that does not require much time commitment, concentration or complex cognitive abilities. For example, playing on an interactive tabletop with natural forces like wind, sun and rain or 'conjuring' a storm can help the child work through their emotions and fears in a metaphorical way.

For this type of play it is important that the surface of an interactive tabletop is highly responsive. Otherwise, the child can get frustrated and discouraged which would interrupt the therapeutic process rather than support it. We recommend introducing music, noises and sounds to the system. Calming effect of rain and bird singing has already been proven beneficial in our study. Since children with ADHD tend to be impatient, it is essential to provide sounds that can sooth child's hyperactive state. Computer freezing is another issue to be seriously considered. The system should be sturdy enough and have a back up in case the child's work is lost.

New Ways of Supporting Child's Cognitive Abilities in Therapy
Here we consider ways and strategies to support child's expression if play involves such abilities as good memory, focus and attention.

As our experience shows, to enable the child to create stories in a therapeutic context, instructions are needed to guide and support the child. According to non-directive play therapy principles, the direction has to come from the child, which means that the therapist cannot even offer help until explicitly asked. Since, non-directive play therapy aims to encourage the child's sense of mastery and empowerment it is necessary to provide toys and materials which can be easily used.

To meet this challenge, some of the therapists suggest having the instructions incorporated into the system in the form of an animated character. The child, in this case, will have full control of what and how to ask the animated character, which would not interfere with therapist/child relationship. In addition, this guidance can keep children with ADHD focused and interested in the play activity.

Another way of supporting the child in storytelling is through creating short instructional videos. The video of

someone making stories on an interactive tabletop could be available for the child in their therapy sessions. It could remind them of what options they can use and what is possible in Magic Land or similar application.

We would not recommend adding prompts or other attention catching options into the system unless it is to be used within more directive approaches to play therapy. If, however, applications are designed within directive therapy framework, structure and guidance are highly encouraged. An application in such a case, could present a goal-oriented environment enabling the child to make a step-by-step story. Such guided approach could prevent the child from getting overwhelmed with many options and images presented in the system. In addition, it may help control the child's impulsive play that leads to computer 'freezing'.

Also, guidance could be beneficial if the system reacted to the child's inactivity on an interactive tabletop. For example, if the child stopped playing for a considerate period of time, the system could give a prompt in a way of a sound, image or verbal invitation to continue play. We would recommend providing the child with diverse options (e.g. through combining tangible toys and digital environment on an interactive tabletop) to avoid the child getting bored quickly. We find interactive tabletops more suitable for child's play than traditional computers as they allow for freedom of movement around them and easy access to the screen from many angles.

CONCLUSION

As we initially argued, there is lack of exploratory studies on the use of technology and interactive tabletops in play therapy with primary school children. As such, our development of design guidelines and our qualitative study of the use of *Magic Land* is a much-needed contribution to our understanding of how digital toys could be designed on interactive tabletops.

We have drawn on our experience of using Magic Land with children suffering ADHD and speculated on how systems could be designed to support children experiencing difficulties with memory, focus and concentration in the context of play therapy.

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