

# **Use of interactive video modeling for teaching social skills in Asperger's and high functioning autism**

## **Chapter 1**

### **Introduction**

Social skills are the behaviors, both verbal and non-verbal, that we use to successfully navigate social situations. Positive social skills include smiling, making eye contact, asking questions, responding to greetings, and properly initiating social contact (Rao, Beidel, & Murray, 2007). According to Hartup (1989), having good social skills as a child leads to positive life outcomes, such as being accepted by peers, having academic success, and achieving mental health.

Children with Asperger's Syndrome (AS) or high functioning autism (HFA) have trouble developing appropriate social skills (Attwood, 2006). AS/HFA is a developmental disorder on the autistic spectrum that is characterized by social and communication deficits (Sansoti & Powell-Smith, 2008). Unlike other children on the autistic spectrum, children with AS/HFA do not show delays in language or cognitive development; however, they do have difficulties with social development (Koning & Magill-Evans, 2001). This impairment has an effect on academic and emotional well-being, as well as social (Hartup, 1999).

Social skills training programs (SST) were created to teach children appropriate skills to be able to successfully navigate social interactions (Solomon, Goodlin-Jones, & Anders, 2004). SST programs are very important for the AS/HFA population, since their main difficulties lie in the social realm. Although the effectiveness of SST interventions has been supported by research (Rao et al., 2007; Attwood, 2006; Solomon et al., 2004; Hagiwara & Myles, 1999; Rust & Smith, 2006), very few have been designed specifically for the AS/HFA population (Rao et al., 2007).

However, this is a population that has a great need for training since their other skills are at a functional level and they tend to be mainstreamed into regular classrooms with typically developing peers (Carrington & Forder, 1999). Children with AS/HFA can be very successful in life if they receive effective social skills training (Attwood, 2006).

Research suggests that SST should focus both on teaching functional skills, and maintenance and generalization of skills (Sansoti et al., 2004). Therefore, training methods should incorporate socialization skills and also teach perspective-taking so children with AS/HFA can continue to apply the skills they have learned (Attwood, 2006; Ozonoff, 1998). A very popular method of SST that includes these components is the use of social stories, developed by Carol Gray based on her work with the autistic population (Attwood, 2006).

Gray developed social stories to target the specific needs of children with autism (Rust & Smith, 2006). Typically developing children usually intuit appropriate behavior, and are able to adapt to different situations (Solomon et al., 2004). Children with AS/HFA generally find social situations confusing, and may master one particular situation only to find themselves back at square one in another, albeit similar, scenario (Rust & Smith, 2006). Social stories explicitly describe what should happen in a particular situation, and outline how it should happen and why (Sansoti et al., 2004). Once a social story is written it is reviewed repeatedly until the child is comfortable with that particular scenario. It is an appropriate strategy for this population, because children with AS/HFA enjoy repetition (Rust & Smith, 2006). This makes social stories a comfortable way to learn an uncomfortable skill.

Social stories are thought to be effective because using the visual mode to present information in a written format is much less confusing for children with autism than presenting information verbally. Also, the lack of social interaction that is inherent in social skills groups

means that social stories provides a less anxiety-provoking way to practice skills (Rust & Smith, 2006). To successfully administer a social story, one should first make sure the story has been understood by the reader, stick to an implementation schedule, and then monitor progress once the story has been introduced (Sansoti et al., 2004).

While research so far seems to support the use of social stories (Sansoti et al., 2004), and SST in general (Rao et al., 2007), there is still a lot that has not been empirically studied, including identifying misunderstandings that cause the social difficulties, so they can be specifically addressed in the social story; clearly identifying behaviors that can be modified through social stories; and how best to generalize behavior across settings (Rust & Smith, 2006). Individual cases of social story use have been examined for effectiveness, but there were many confounding factors that limit the usefulness of these studies (Sansoti et al., 2004). In most cases, children received other forms of treatment in addition to the social stories (Rao et al., 2007).

Additionally, if social stories are effective, it is not clear from existing studies which components of developing the stories are necessary for effectiveness, nor has there been consistency in applying the stories. There are currently no studies that examine the long-term effectiveness of social stories and how well behaviors generalize across situations (Sansoti et al., 2004). Perhaps most importantly for the current study, there are almost no studies that focus exclusively on students with AS/HFA, despite the fast growing rate of this population in comparison to that of lower-functioning autistic children (Solomon et al., 2004).

It is difficult to create a rigorous experimental design for social stories for several reasons. Social stories are by nature an individualized treatment, and are not administered in groups. It can be difficult to find large enough samples of students who have the same difficulties in the same social scenarios (Rust & Smith, 2006). Experimental design calls for large enough

groups to balance out chance, and ideally control groups for comparison. Treatment should be studied over time to test long-term effectiveness, and across many situations to test generalizability (Sansoti et al., 2004). However, single case designs can still provide useful information to complement large-scale studies, such as why this technique does or does not work with a specific individual (Sansoti et al., 2004), or how certain aspects of the training are experienced by students, and how the process can be improved.

### **Statement of the Problem**

The problem that this study deals with is that children with AS/HFA are in desperate need of social skills training interventions, since they tend to be mainstreamed (Carrington & Forder, 1999), but few of the available interventions have been studied experimentally. Social skills training programs, and the use of social stories in particular, show promise as a tool for teaching social skills (Rao et al., 2007). Yet there are so far few studies that show that social stories are effective with this population (Solomon et al., 2004) and there is a question as to whether video and VE based stories are viewed as realistic representations of social scenarios (Parsons, Leonard, & Mitchell, 2006).

Despite the existence of some studies on the effectiveness of social stories, meta reviews of the research showed the difficulty of studying such an individualized treatment and the lack of knowledge that exists so far on the topic of social skills training and generalizability of training (Rao et al., 2007; Sansoti et al., 2004). Although some researchers point to successful implementations of social stories, there is no real evidence whether effects last beyond treatment or how well students can transfer their knowledge to other scenarios (Sansoti et al., 2004). Computer based technologies such as static images, audio and video, and virtual environments are being used to create more realistic practice environments to make it easier for students to

generalize their skills from the learned scenario to real-life situations (Hagiwara & Myles, 1999). To date, there are almost no studies that examine whether or not effectiveness and generalizability increase with the addition of multimedia to social stories. A major question raised by researchers is whether students even find computer-based stories to be a realistic representation of the scenario they are practicing, or whether it feels too much like a game where the outcome doesn't really matter (Parsons et al., 2006).

By examining student reactions to and perceptions of 3D interactive video stories using a case study methodology I will explore the interactions between the student and the social story and perhaps shed light on recommendations for best practice that can be incorporated into future multimedia stories.

### **Purpose of the Study**

The purpose of this qualitative study will be to explore student perceptions of multimedia social stories created using interactive video among a group of adolescents taking part in social skills training in a clinic setting, in order to understand how that might impact on their ability to generalize skills learned by using the videos. A series of case studies will be presented that address the following research questions:

- Do students with AS/HFA perceive video-based social stories to be relevant and useful to real life scenarios?
- Do social skills improve after practice with interactive video social stories recorded in a 3D environment?
- Do students enjoy working with interactive video social stories recorded in a 3D environment?

- Do therapists report that interactive video social stories recorded in a 3D environment enhance students' understandings of certain social situations?

### **Limitations**

This study will be performed with students diagnosed with AS/HFA who are aware of their social difficulties, and are currently involved in social skills group training in a clinic to improve their overall social understanding. An attempt will be made to gather students with similar social skill profiles; however, given the nature of autism it can be hard to find two students at the same developmental level, and with the same social difficulties so the available pool of participants will be limited.

### **Delimitations**

A small number of middle school-aged students will be used in order to provide a rich, detailed description of each case study. The focus of the study will be on the experience the students have interacting with the videos and using them as a training tool, rather than attempting to assess skill improvement over the course of the study. Recommendations will be proposed, based on the data analysis, for future versions of the training tool and for future studies of social skills training using interactive video.

### **Definition of Terms**

AS/HFA – Asperger's syndrome/high functioning autism: A disorder on the autistic spectrum characterized by social and communication deficits.

Executive functions: Defined by Solomon et al. (2004) as mental skills required for problem solving and involve forward planning, impulse control, inhibiting irrelevant responses, and flexible thought.

Generalizability: Whether or not skills learned in a training session continue to be displayed after training ends.

Social skills: Defined by Rao et al. (2008) as verbal and non-verbal behaviors used to successfully navigate social situations.

Social stories: Created by Carol Gray (Rust & Smith, 2006). Stories that identify a specific social situation and outline appropriate responses as a way for children with autism to rehearse strategies for interacting appropriately with their peers. Social stories are written individually for each child and focus on the specific skills that the child is lacking.

SST - Social skills training: A formal program created to teach appropriate skills necessary for navigating social situations.

VE/VR – Virtual environment/Virtual reality: 3 dimensional computer simulated environment that provides realistic rendering of a scenario.

### **Significance of the Study**

This study will take an in-depth look at the experience of using interactive video for social skill training. It will hopefully provide insight into how students using the videos view them, both as a tool for practice and as a representation of reality. It will also explore the question of whether the videos have an impact on social understanding that will be useful to therapists and teachers who work with students with AS/HFA.

## Chapter 2 – Literature Review

### Introduction

Asperger's syndrome is a disorder on the autistic spectrum characterized by social and communication deficits. It is diagnostically similar to high functioning autism and the two terms are functionally interchangeable. Children with Asperger's generally suffer from social problems because of a lack of emotional empathy and practical language skills, which can affect psychological and academic development (Attwood, 2006). Current theories of core deficits in Asperger's include lack of emotional understanding and empathy; deficits in theory of mind, or lack of ability to attribute thoughts and emotions to others; and problems with executive functioning, which impairs problem solving abilities and causes inflexibility of thought (Solomon, Goodlin-Jones, & Anders, 2004).

Social skills are necessary for establishing healthy, appropriate relationships. Without properly developed skills children with Asperger's suffer social rejection and isolation, often leading to anxiety and depression (Koning & Magill-Evans, 2001). Because of their high intelligence, they are painfully aware of their deficits, despite often having a strong drive to develop friendships with peers (Parsons, Leonard, & Mitchell, 2006).

Social skills training programs have been developed to teach children with autism how to interact in a more appropriate way with peers, in order to encourage positive social relationships (Rao, Beidel, & Murray, 2007). Although research on the effectiveness of social skills training is limited, it is positive so far and indicates that with proper training this population can be taught how to have satisfying, meaningful peer relationships (Solomon et al., 2004). However, to date few programs have been designed specifically for the high functioning population, despite the

fact that they need it the most. Research indicates that more study is needed in order to develop evidence-based training programs, and that programs should target the high functioning population (Rao, Beidel, & Murray, 2007).

### **Overview of AS/HFA**

Asperger's Syndrome (AS) is a developmental disorder that was first identified by Hans Asperger in 1944 and added to the American Psychological Association's Diagnostic and Statistical Manual of Mental Disorders (DSM) in 1994 (Attwood, 2006). AS is characterized by deficits in the 3 areas of social development, communication, and repetitive behaviors (Sansoti & Powell-Smith, 2008). AS is very similar to another disorder, known as high functioning autism (HFA), and to date no study has convincingly established them as distinct disorders. The two terms are often used interchangeably, and AS is considered a disorder on the autistic spectrum (Attwood, 2006).

Unlike lower functioning children with autism, children with AS typically have no significant delays in language development (Sansoti & Powell-Smith, 2008). However, Attwood (2006) noted that they do show unusual use of language including the tendency to be very literal, difficulty with small talk, overly formal speech, and trouble getting to the point in a conversation. They display odd rhythms of language, such as a lack of reciprocity in conversation, a tendency to interrupt, and difficulty ending a conversation appropriately. Many children with AS believe the point of a dialogue is to exchange information and consider it a waste of time if there is nothing to learn from a particular conversation (Attwood, 2006).

These communication deficits can lead to difficulties with social interactions (Sansoti & Powell-Smith, 2008). Children with AS lack an appreciation of social cues, are unable to interact appropriately with peers, and have trouble forming and maintaining relationships (Koning &

Magill-Evans, 2001). They are unable to develop successful social skills, which can be defined as “specific behaviors that result in positive social interactions” (Rao et al., 2007, p. 353).

Examples of social skills include making eye contact, asking questions and responding appropriately, initiating social contact, and appropriate emotional responses (Rao et al., 2007).

**Core Deficits.** Solomon et al. (2004) summarized the current theories regarding the core deficits of AS/HFA, in no particular order of importance. According to many researchers people with AS/HFA suffer from emotion-based deficits; that is, they do not process emotions the same way that other people do. Studies have shown that people with AS/HFA have trouble identifying their complex emotions such as pride and embarrassment (Capps, Yirmiya, & Sigman, 1992). It is also difficult for them to recognize others' emotions portrayed in video clips (Yirmiya, Sigman, Kasari, & Mundy, 1992). It seems that children with AS/HFA do not make the same connections between social knowledge and performance of accepted social behaviors as typical children (Solomon et al., 2004). This makes it hard to judge an appropriate social response when one is called for.

A second main theory involves deficits in theory of mind. Theory of mind is the ability to recognize that other people have thoughts and feelings that are different from one's own, and the ability to predict behavior based on that understanding (Solomon et al., 2004). Although many people with AS/HFA can pass theory of mind tests, they seem to rely on context inappropriate clues to reach their answers, and to rely more on their verbal skills than non-verbal to figure out what's going on in a particular situation (Bauminger & Kasari, 1999). It appears that their understanding of theory of mind is based on explicit learning and requires a lot of thought, rather than being able to develop an “instinct” like typical children do. This makes it difficult for them to react as quickly in complex social situations (Solomon et al., 2004).

A third theory of deficits in AS/HFA explores executive functioning. Executive functions are required for problem solving and involve forward planning, impulse control, inhibiting irrelevant responses, and flexible thought (Solomon et al., 2004). Children with AS/HFA typically display impaired executive functioning, which leads to inflexible thinking, difficulty shifting from one problem solving strategy to another, a narrow range of interests, lack of “common sense” despite high IQ and good rote memory, and being uncomfortable with minor changes in routine (Ozonoff, 1998). All these things contribute to a difficulty in coping with unpredictable, changing social situations.

### **Social Ramifications**

Social skills can affect acceptance by peers, academic success, and psychological well-being. Children with poor social skills experience rejection and consequently have more problems later in life (Hartup, 1989). Children with AS/HFA are very intelligent and therefore are often aware of their deficits and the social rejection that comes with it (Parsons, Leonard, & Mitchell, 2006). Although many people with AS desire friendships and social bonds, most find this challenging and an ongoing source of frustration (Koning & Magill-Evans, 2001). In fact, the majority of adolescents with AS also suffer from anxiety and/or depression (Attwood, 2006).

While children with AS/HFA are aware that their skills are not on the level of their peers, parents often rated their children even lower in these skills than the children do, indicating a lack of awareness of the true severity of the problem (Rao et al., 2007). Additionally, these children are caught in a repeating cycle where a lack of social skills limits their opportunities to practice and thereby increase their skills. It is hard to develop age-appropriate skills without regular interaction with peers (Koning & Magill-Evans, 2001).

## **Social Skills Training**

Social skills training programs have been developed in order to train these children in the skills that they need in order to have successful social interactions (Rao et al., 2007). These programs teach specific skills that foster positive social interactions and should enable the children to be accepted by peer groups and create appropriate friendships. Rao et al. (2007) pointed out that while research so far supports the use of SST programs, there are very few that have been specifically designed for children with AS/HFA. Despite the fact that this population has a strong need for social skills intervention (Rao et al., 2007), due to the fact that they tend to be mainstreamed in school (Carrington & Forder, 1999) and therefore to have a lot of interactions with typically developing children, most SST programs do not target the specific deficits these children have (Bernard-Ripoll, 2007).

Currently, SST programs teach communication skills such as initiating and responding to a greeting, interrupting, and reciprocity (Attwood, 2006). However, few focus on teaching emotion understanding (Carrington & Forder, 1999) and how to react properly to emotions (Bernard-Ripoll, 2007), despite the fact that even high functioning children with autism have difficulties recognizing and labeling complex emotions such as pride and embarrassment (Capps et al., 1992).

Rao et al (2007) discussed the available social skills training (SST) methods in their literature review of efficacy of treatments. They described traditional classroom-based SST, during which short training sessions take place that focus on basic skills such as greetings, initiating and responding to interactions, and turn taking. Teachers provided feedback during a free play session when children use skills appropriately. There are many versions of SST run by teachers and therapists, but the basic characteristics are the same.

Barry et al. (2003) described their use of social scripts, a combination of pictures and written cues, that guide children through a particular social situation. The scripts were used in a series of SST sessions that included free play with typically developing peers to encourage generalization of skills learned. Pre and post assessments were taken on various skills both in and outside of the clinic. Parent interviews were included as well. Using pictures and including typically developing peers is a good addition to SST that can help students generalize the skills they are learning to post-treatment settings. Social skills groups are the most common intervention used for people with AS/HFA (Solomon et al., 2004), despite the fact that little research has been done to determine how effective social skills groups are (Barry et al., 2003). Group settings allows for practice in a natural environment, which individual therapies do not (Solomon et al., 2004). However, groups can be difficult to put together (Rao et al., 2007) since it requires matching students for severity of diagnosis, age, cognitive levels, and personal compatibility (Solomon et al., 2004).

Another common method of treatment is the use of social stories (Rao et al., 2007). Developed by Carol Gray in 1993, social stories identify a specific difficult social situation and outline appropriate responses as a way for children with autism to rehearse strategies for interacting appropriately with their peers. Social stories are written individually for each child and focus on the specific skills that the child is lacking (Rust & Smith, 2006).

Social stories are made up of short scenarios that describe a specific situation and identify appropriate responses (More, 2008). They contain 4 sentence types, as defined by Gray: descriptive, outlining the scenario; directive, defining the appropriate response; perspective, describing the feelings of other people in the story; and affirmative, stressing the important points of the story (Sansosti et al., 2004). Social stories are appropriate for high functioning

students with good verbal skills, such as those with AS/HFA (Hagiwara & Myles, 1999).

Although they were not developed based on research or theory (Attwood, 2006), studies do support the use of social stories with this population (Rust & Smith, 2006). Social stories clearly outline the expected behavior, so there is no ambiguity, and allow for unlimited repetition – something children with AS crave. However, most research on social stories lacks experimental controls or includes confounding variables, so that it is difficult to determine the extent to which social stories alone caused the improvement in behavior (Sansosti et al., 2004). Additionally, there are inherent difficulties in developing a rigorous experimental design to something that is so individualized (Rust & Smith, 2006). Sansosti et al. (2004) recommended that in addition to more rigorous research design, future studies should include studying what the critical components are of a social story, and how to create stories that lead to maintenance and generalization of skills.

Rust & Smith (2006) provided some guidelines for future research as well. Among other things, they suggested that the researcher should make sure the social story has been understood before testing any change in behavior; take into account both frequency and duration of behaviors; use multiple raters; and clearly identify the behaviors, appropriate and inappropriate, that will be monitored. There are currently no standardized tests of social interaction and reasoning that can assess what Attwood (2006) calls a “social quotient” (p. 4) for children, so it is important to define a “core” set of social skills that need to be developed. Solomon et al. (2004) pointed out that one of the problems with social skills research to date is the lack of a uniform definition of social skills.

### **Extending effectiveness of social stories with multimedia**

Computer multimedia can be used together with social stories to make them more

interesting and appeal to a broader range of children, which leads to better learning (Hagiwara & Myles, 1999). In general, computers have been shown to be a valuable tool for teaching children with autism. Parents report that children with autism are fascinated by computer programs and researchers have found that computers can be effective in teaching social skills to these children (Bernard-Opitz, Sriram, & Nakhoda-Sapuan, 2001). Computers have several advantages for this population, including instant feedback, unlimited repetition without annoying others, lack of public criticism when making mistakes, and the fact that they tend to be more relaxed when involved in a solitary activity (Attwood, 2006).

Hagiwara & Myles (1999) studied whether children could generalize the skills they learned to their every day environment, a result that is key to SST programs but is lacking in programs that have been studied so far (Rao et al., 2007). Their study, while not conclusive because of the small sample size used, did find positive results for using technology with this population. A study by Lacava, Golan, Baron-Cohen, & Myles (2007) showed similar results when looking at the effectiveness of a computer program to teach emotion recognition to students with AS.

More (2008) developed a system called digital stories to make it easier for teachers and therapists to develop multimedia social stories. Students can add their own images and sound to their stories, which increases interest in using them and creates ownership of the project. Use of digital media makes story creation more efficient for teachers, because they can easily reuse photos, copy and paste materials to make changes, and take into account a wider range of learning preferences and skill levels (More, 2008).

More (2008) described how teachers and therapists can create a bank of images using digital photos of people and places that students recognize from home and school. Students can

include objects that they enjoy as well. Students record scripts in their own voices, which are included in the digital stories with the photos they have chosen. By using recognizable sights and sounds in the stories, students feel like the stories are really about them. This increases interest in and attention to the stories (More, 2008).

### **Extending Engagement In Media With Virtual Reality**

Two dimensional media has the ability to increase interest in social stories, as well as provide additional media options for students who do not work as well with text and audio (Carrington & Forder, 1999). Virtual reality (VR) extends this even further by providing more realistic 3D virtual environments (VEs) that can more accurately depict social scenarios (Parsons et al., 2006; Parsons & Mitchell, 2002). Because virtual reality provides a more realistic environment than a 2D multimedia presentation, it not only provides a review of appropriate behavior but also a chance to apply them in context (Parsons & Mitchell, 2002).

When children are presented with a social story, they review it so when they are in a similar situation they will hopefully remember an appropriate response. To increase generalization of skills outside the treatment context, children can review the stories and multimedia presentations with a parent at home (Scattone, 2007); however, this is still not the context in which the skills need to be applied. Usually the target skills are required for school and informal social interactions with peers (Bernard-Ripoll, 2007). Practicing in VEs allows children to experience applying skills in context (Parsons & Mitchell, 2002).

Working with VEs can reduce anxiety in a child who craves repetition and control over their environment – two things that peers will not provide so easily (Parsons & Mitchell, 2002). Some researchers are concerned that people with AS/HFA may find the solitary nature of computer-based training so appealing that it will encourage them to spend less time socializing

with peers in the real world instead of more (Howlin, 1998). However, Parsons & Mitchell (2002) point out that if the computer-based training is combined with therapist interaction, then VEs can be viewed as using a natural strength (computer enjoyment) to help bolster a natural weakness (social skills).

VEs provide a safe environment for repeated practice. Children can practice applying skills without having to worry about actually offending anyone if they make a mistake. They can repeat a scenario over and over until they feel comfortable responding to that particular situation. By being able to “role-play” several different scenarios, users can develop more flexibility in social problem solving (Parsons & Mitchell, 2002).

Cobb et al. (2002) explored using both single user VEs (SVEs) and collaborative VEs (CVEs) for social skills practice. SVEs provide a safe area where users can return to practice as often as they'd like. CVEs provide a collaborative area where several users can interact together to practice skills in an interactive environment. They concluded that SVEs encourage repetitive practice in a structured environment to review their skills and that CVEs allow users to test their skills in a realistic setting where they have to react to an unpredictable situation. Although CVEs are unpredictable scenarios, they still represent a safer level of practice than a school playground and allow mistakes to be made without negative consequences (Cobb et al., 2002). This reduces social anxiety and encourages users to be more flexible rather than falling back on repetitive behaviors (Parsons & Mitchell, 2002).

### **Perception of realism in VEs**

A study by Moore et al. (2005) explored whether or not children with autism could infer correct emotions from facial representations of a computer avatar. Understanding of emotions is crucial for good communication, and emotions are communicated more via facial expressions

than words. Participants interacted with a computer system that was built to evaluate their understanding of avatar expressions. The study found that the majority (90%) of participants were able to successfully interpret the avatars' representations of emotion and infer causal events from an expression. Moore et al. (2005) concluded that CVEs can be a powerful tool for teaching children with autism.

Parsons et al. (2006) studied the effectiveness of VEs in helping children generalize social skills beyond the therapy sessions. They also looked at how children viewed the VEs and if they felt VEs were realistic and could be helpful to them in learning social skills. VEs will not encourage generalization of skills if users do not view them as a realistic substitute for real-life practice (Parsons et al., 2006). They found that although users showed some repetitive responses, literal interpretations of scenarios, and did sometimes apply game-like logic to scenarios, overall they did interpret scenarios realistically and enjoyed talking about the VEs and how they were relevant to the real world.

### **Video Modeling**

Video modeling demonstrates desired behaviors through video representation (Sansoti & Powell-Smith, 2008). Video modeling is based on the theories of Albert Bandura, who found that children learn new skills by watching other people and modeling their behavior. He noted that attention and motivation increase learning through modeling (Bellini & Akullian, 2007). A meta analysis done by Bellini & Akullian (2007) suggested that video modeling is a very effective strategy for addressing the social and communication deficits found in children with autism. Video modeling has been shown to teach skills that are generalizable to different settings (Charlop & Milstein, 1989).

Video modeling can be combined with the use of social stories to teach appropriate skills

to children with AS/HFA (Bernard-Ripoll, 2007; Scattone, 2007; Sansoti & Powell-Smith, 2008). Utilizing visual cues is a useful strategy in teaching children with AS/HFA (Bernard-Ripoll, 2007) and enhances the effectiveness of social stories (Scattone, 2007). Bernard-Ripoll (2007) found that the combination of social stories and video modeling was effective in teaching emotion recognition to a 9 year old boy with AS. The subject was able to learn to understand emotions in himself and others, and to generalize this knowledge to other situations.

A study by Scattone (2007) found similar results. Three social stories were written for the study and then adults modeled the target behaviors on video. The subject viewed the videos in a clinic setting, and then reviewed them at home with his parent's supervision. The subject did increase the target behaviors after treatment, and showed some generalization of skills to a school setting. The subject's mother reported that it was hard to maintain her son's interest in continuing to view the same videos for the entire duration of the study, so it was concluded that it would be better to use multiple videos with different stories targeting the same skill. The author also suggested that a reinforcement component would help with motivation.

### **Interactive video = Video modeling + interactive VEs**

The interactive nature of VEs provides a practice environment not available with video or social stories, but they can be time consuming and expensive to produce. Interactive video recorded in a 3D environment, known as machinima, or machine cinema, can perhaps provide an alternative solution that is both easier and cheaper to produce. There are several free and commercial 3D environments that can be used to stage videos, including but not limited to Second Life, Alice, Halo, and MovieStorm. Each environment has its own advantages and disadvantages that need to be considered for a particular project. Video recorded in any of these environments can be combined with the annotation feature found on Youtube.com, a popular

video hosting website, to create “choose your own adventure” videos that can serve as a practice ground for applying social skills.

Students could undergo social skills training, either through traditional classroom or clinic-based SST or a social skills group, and then be presented with an interactive branching video story. Segments are pre-recorded, so students would not have to worry about offending any real-life peers with their behavior. As discussed previously, this reduces anxiety and increases learning (Parsons & Mitchell, 2000). The story could have several branches to accommodate multiple possible reactions on the part of the user, it would contain enough unpredictability to test mastery of skills as well as maintain user interest over several viewings. Additionally, since branching video stories are more structured than a VE where the user has the freedom to move around and explore, this reduces the tendency to view it as something to be played rather than learn from, a concern that was pointed out by Parsons et al. (2006) in their study. This branching story is similar to the SVEs described by Cobb et al. (2002) and provides an ideal practice environment.

## **Conclusion**

Social skills training programs have so far proven effective in improving skills in the autistic population. SST relies on the desire this population has for routine by providing an environment for social skill practice (Rao, et al., 2007). Training can be enhanced by the use of technology; computers are very appealing to children with AS/HFA and they increase motivation for learning. Multimedia combined with social stories can lead to better learning of social skills (Hagiwara & Myles, 1999). The latest social skill research is investigating the use of both single user VEs and collaborative VEs to provide additional opportunities for realistic practice (Cobb et al., 2002).

I propose that the use of interactive video-based social stories recorded in a 3D environment using machinima technology can be used to fill a gap in existing social skills training for the AS/HFA population. They provide the repetitive nature of other computer-based training programs, as well as the realism of virtual environments. With the rising popularity of machinima, there are more technologies available to produce these videos that enable creation of cost-effective movies. Videos can be combined to create a branching story that taps into the power of social stories, a proven social skills therapy. Once a video has been produced, it can be reused either in future therapy sessions or even at home, providing extra practice. Interactive branching videos have the potential to add a powerful new method of social skills training to the high functioning autistic population.

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