Design and Implementation of Educational Games:
Theoretical and Practical Perspectives

Pavel Zemliansky
James Madison University, USA

Diane Wilcox
James Madison University, USA

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Chapter 21
Benefits of Video and Eye Toy Gaming for Children with Autism

Nava Silton
Fordham University, USA

Ann Higgins D'Alessandro
Fordham University, USA

ABSTRACT

The purpose of this chapter is to illustrate how video games, which incorporate eye toy technology, can be utilized to teach social learning to children with autism directly through video modeling and multimedia social story interventions and indirectly through engaging typically developing students with educational video games that increase their sensitivity, knowledge, and behavioral intentions when interacting socially with children on the spectrum and with other disorders, as well. The popular medium of gaming is designed to enhance the appeal of rote instruction for children and their families as well as to create tools that improve a child's ability to generalize learned social and adaptive skills. Moreover, these tools will offer richer research methodologies for tracking and understanding important micro-developmental changes in daily and weekly interpersonal skills development among both typical and atypical children.

INTRODUCTION

The purpose of this chapter is to illustrate that video and eye toy gaming can be used to enhance the social learning of children with autism directly through video modeling and multimedia social story interventions and indirectly through engaging typically developing students with educational videos that increase their **sensitivity**, knowledge, and **behavioral intentions** when interacting socially with children with autism, and perhaps other disorders as well. We suggest that it is important to develop typical children's positive attitudes and intentions toward peers with disabilities. Research has shown that this can be accomplished through video which has the power to influence a person's perception and subsequent behavior in other situations, for instance, in moderating the development and use of stereotypes regarding race (Givens & Monahan, 2005; Ward, Hansbrough, & Walker,

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2005). Thinking creatively about the power of gaming to enhance development and social interactions among typical and atypical children, as specifically illustrated here for children with autism, will help bring interventions for atypical children into the 21st century as well as allow the development of much richer research methodologies for tracking and understanding important micro-developmental changes in daily and weekly interpersonal skills development.

Specifically in this chapter we address how video games which involve eye toy gaming, can be used as a teaching tool for children with autism to enhance the appeal of rote instruction for children and their families as well as create tools that can enhance a child's ability to generalize learned social and adaptive skills. An eye toy refers to a small low resolution camera used in video games to capture "players" and insert them directly into the onscreen game. Eye toy technology could be utilized to employ "video self modeling" (VSM), i.e., giving children with autism the ability to capture their own desirable behaviors on-screen. Additionally, we suggest that using video and eye toy gaming as an educational tool enhances the **sensitivity** and skills of typically developing children, enabling them to feel more at ease and competent with their atypical peers. These themes of the appeal of the educational tool, of the generalizability of key skills learned through the video tool, and of the sensitivity of others to children with autism are woven throughout the chapter. The rationale for particularly intervening with children on the autism spectrum will be tackled by delineating the high prevalence of autism today, the characteristic deficits associated with autism, the pervasive effect of autism on the family unit, the stigmatization of behavioral disabilities such as autism in both the school and social environment and the particular affinity children with autism appear to have for computers, mechanical toys and visual mediums. The potential of video modeling, video self modeling, and social stories to overcome limitations and expand current educational tools for autism will then be addressed to show how video games incorporating eye toy gaming can enhance both typical and atypical children's sensitivity and social skills. Finally, the chapter will close by speculating how a theory pertaining to our bio-evolutionary roots may lend further support to the effectiveness of video and eye toy gaming for teaching generalizable skills and by suggesting further routes towards utilizing video and eye toy technology.

We perceive video games featuring eye toy gaming as transformative instruments in the future education of all children due to its interactive nature which allows ideas and skills to meet each child where he is, and not to demand equal skill levels required for reading, writing, and arithmetic. Promoting and keeping young children with behavioral disabilities more "on track" with individualized but social experiences may be the best educational tool possible for them and the richest education possible for typical children. Thus the specific goals of this chapter are twofold: one, to present a strong case that video games can be successfully used to enhance the social learning of children with autism, and two, to demonstrate that these same techniques can be used to heighten the sensitivity and social skills of typically developing children when they interact with each other and with their atypical peers.

BACKGROUND

Epidemiology of Autism

Autism identified by Kanner in 1943, is a lifelong neuro-developmental disorder which begins in infancy and is characterized by impairments in everyday living skills, social skills, communication, and language, and by the presence of repetitive, obsessive behaviors, and rigid, and focused interests (Silton, 2009; Volkmar & Pauls, 2003). Deficits in everyday living and social skills and communication, language vary along a continuum from mild to severe, thus children receive diagnoses along the autism spectrum.

Autism is the nation's fastest growing serious developmental disorder and has reached epidemic proportions over the last few years. Diagnoses are rapidly increasing from about 10% to 17% per year (Autism Speaks, 2006). Moreover, **autism spectrum disorders (ASDs)** and behavior disorders surpassed the number of individuals with mental handicap in 2000 with a prevalence of 22% and 25%, respectively, according to an application distributed to families of children with a severe disability (Nessa, 2004). The most recent statistics on ASDs suggest that **autism spectrum disorders**, account for more diagnoses than childhood cancer, AIDS and diabetes combined (CNN Report, 2007).

Some researchers hypothesize that this rise is due to increased awareness of autism spectrum disorders in the medical community and to a wider spectrum of what constitutes autism spectrum disorders. Researchers continue to deliberate over the causes for autism and over the causes for increasing rates of the disorder. Since autism is often diagnosed between eighteen months and two to three years of age, various researchers used to implicate Thimerisol, a compound composed of 49.6 percent mercury present in the measles, mumps and rubella (MMR) vaccine, as a primary cause for autism (Blaxill, Redwood, & Bernard, 2004). Overall, the research has largely refuted the Thimerisol hypothesis. Some think that diagnosis shifting is the principal cause for increased reported rates of the disorder. However, critics of this proposal have posited that diagnosis shifting would likely cause declines in rates of reported mental retardation and speech and language delays, but no differences have thus far been reported (Newschaffer et al., 2005). Although the etiology, pathophysiology and genetic transmission of autism are controversial and still mostly unknown, autism may best be perceived as a heterogeneous disorder, resulting from multiple genetic and environmental factors, which are often exacerbated by neurologic, cytogenetic, neurotransmitter, and immunologic abnormalities (Hollander et al., 1999). Since children with autism show no physical signs of having a disorder, their often peculiar, repetitive, and asocial behaviors are misunderstood, and are often perceived as under their control, when in fact such behaviors are not. A report of one family's experience echoes anecdotes of other families; a child's autistic behaviors combined with a public lack of knowledge and misunderstanding lead to stigmatization of the child and his/her parents (Oizumi, 1997).

At Particular Risk for Rejection and Stigmatization

Sensitivity programming is a particularly worthy endeavor since in addition to the high incidence and prevalence of autism spectrum disorders, children with autism are at particular risk for rejection and stigmatization by peers. It is important to specifically explore why typical peers of children with autism may find it particularly challenging to interact with a child on the autism spectrum and why children with autism may be classified as unpopular in the classroom. A variety of intervention studies are designed to address the deficits of unpopular children (those with poor social skills), since studies have noted that particular types of behaviors, personality, and physical features (e.g. aggression, hyperactivity, social withdrawal) evoke negative reactions from peers (Juvonen, 1992). Previous research suggests that typical children identify aggressive, hyperactive, or socially withdrawn peers as deviant from others and therefore typical peers are more likely to reject children who display these behaviors (Juvonen, 1991).

Despite their typical appearance, children with autism often display severe and disruptive antisocial behaviors, self-destructive acts, inappropriate public behaviors, and tantrums which frequently lead to stigmatization (Gray, 1993). This combination of a typical physical appearance and highly disruptive behavior often also stigmatizes parents of children with autism and is typically met with hostile, insensitive and negative reactions from the public, given their lack of understanding and

knowledge of autism (Gray, 1993). Despite findings that aggressive children are actively disliked and rejected, while shy children and those with disabilities are simply disliked and neglected rather than actively rejected (Juvonen & Weiner, 1993), children with autism may suffer from both having a disability and showing disability-related aggression.

In a recent study, children with autism were most highly stigmatized by the public when they produced behaviors such as leaning back and moaning, having a temper tantrum or crying for no evident reason; failing to conform to social norms. Interestingly, however, children with autism were rated less harshly when parents were told of the child's autism diagnosis (Chambres & Vasingle, 2008).

Children with autism spend little time socializing with peers, make and accept fewer initiations, and spend more time playing alone than typically developing children (Koegel, Koegel, Frea, & Fredeen, 2001). Unfortunately, children with autism's lack of effective social interaction skills further exacerbate their maladaptive behaviors and poor peer outcomes. Frea (1995) suggests that inadequate social skills affect development by 1) increasing behavior problems that arise from a lack of social interaction skills, 2) increasing the likelihood of maladaptive behavior in later life, and 3) reducing the positive developmental support and learning opportunities available in successful peer relationships (Disalvo & Oswald, 2002; Frea, 1995). Children with autism are at an increased risk for these adverse consequences given their inability to imitate and comprehend social nuances related to joint play activities and to interpret social initiations by other children. Social skills require the ability to relate to others in a reciprocally reinforcing manner and to adapt social behaviors to a variety of contexts (Schopler & Mesibov, 1986). Unable to relate spontaneously and flexibly to others, children with autism cannot effectively participate in social reciprocity. Thus, while individuals with autism appear to desire social interaction, they are lacking the necessary skills to partake in it (Scott, Clark & Brady, 2000).

The research suggests that even children with mild delays are less accepted as playmates than their typical peers (Hames, 2005). These children express peer-related social skills deficits beyond what would be expected from their developmental age and, as a result, are selected less frequently as friends by their peers (Hames, 2005; Guralnick et al., 1996). Thus those who possessed greater recognition of the deficits of a child with disabilities were more likely to suggest that the child with disabilities would have fewer friends. These results were apparent even in children whose siblings possessed a disability (Hames, 2005).

Difficult Features of Having a Sibling with Autism

There are mixed findings as to whether or not siblings of individuals with disabilities are at greater risk for psychological maladjustment than typically-developing children or whether they glean some advantages from their situation (Burton & Parks, 1994). However, due to the deeper complexity, unpredictability, variability and ambiguity of symptoms of ASD, siblings are thought to exhibit different patterns of strengths and limitations than siblings of children with other disabilities (Verte, Roeyers, & Buysse, 2003).

With respect to the adverse consequences of having a sibling with autism, siblings of children with autism are more predisposed to internalizing disorders, externalizing disorders, adjustment problems and issues with peer relationships than children with typical siblings (Guite, Lobato, Kao, & Plante, 2004). Significant factors which may relate to these psychological difficulties include the sibling's gender, age, birth order and the type and severity of the handicap, caretaking responsibility, parental adjustment and the potential effect of the child with disability on the sibling's future (Konstam, Drainoni, Mitchell & Houser, 1993). Parents report greater stress (Bagenholm & Gillberg, 1991) and greater concern for siblings

than siblings report for themselves. Younger and male siblings reported higher scores on the *Sibling Perception Questionnaire* (SPQ) than older kids; perhaps older siblings are further removed from the acute crises related to the diagnosis or strategies for coping may improve over time (Guite et al., 2004). Similarly younger siblings exhibited more behavioral problems due to attention-seeking while their older counterparts were more capable of adapting: helping older children achieve a more positive self-concept and better social skills (Verte, Roeyers & Buysse, 2003). For instance, siblings of children with high functioning autism (HFA), chiefly those between the ages of 6 and 11, exhibited more internalizing and externalizing problems compared with children in the control group (Verte et al., 2003).

Moreover, negative reactions to having a sibling with a disability principally revolved around feelings of bitterness and resentment due to the additional attention given to the disabled individual and to guilt that they felt for being healthy (Bangenholm & Gillberg, 1991). Finally compared to parents of typical children and children with differing disabilities, siblings of children with autism were more averse in their view of their sibling relationship, more concerned about the future, had fewer words to describe their sibling's condition, felt they could not confide in family members, had more issues with their sibling breaking their things and felt lonelier than siblings of control children (Bagenholm & Gillberg, 1991). In addition to siblings, parents of children with autism experience particularly heightened stress in contending with a child with developmental disabilities in the home.

Video gaming might prove to be an effective method by which to improve children with autism's behavior in the household. This would allow their typical siblings to be involved in their learning process and to potentially view them in a more positive light, thereby helping to reduce any feelings of bitterness or resentment.

Parents' Heightened Distress and Parental Interest in Media's Assistance

Parents of children with autism suffer more stress than parents of non-disabled children and parents of children with a host of other disabilities (Bouma & Schweitzer, 1990; Holroyd & MacArthur, 1976; McKinney & Peterson, 1987). For instance, parents of children with autism reported more depression, social isolation and less parenting competence, marital satisfaction, and family adaptability than parents of typical or Down syndrome children (Bouma & Schweitzer, 1990). In a study of 26 mothers of children with autism, 24 mothers of children with attention deficit and hyperactivity disorder (ADHD) and 24 mothers of typically developing children, mothers of children with autism showed higher levels of psychological symptomatology, higher parenting stress, poorer perceptions of their family environment and their ability to parent siblings, and higher perceptions of internalized problems of siblings than mothers of ADHD and typically developing children (Oizumi, 1997).

Parents and Children's Educational Programming

Parents, in addition to children, are frequent consumers of children's educational programming. A video tool which can build social skills development into the programming and offer a greater visibility of autism in children's educational programming may help society and children better understand and interact with children on the autism spectrum and therefore both directly and indirectly alleviate some of the undue burdens and stress levels with which children with autism and their parents contend. Children's educational programming and gaming are mass-media vehicles through which to teach key social skills to children with autism and to reduce the stigmatization of

typical children towards children with disabilities by teaching typical children sensitivity and positive social interactions with children on the spectrum. Knowledge and sensitivity training on disabilities for parents in general would be useful, but parents of children with autism and other less visible disabilities may especially appreciate efforts towards integration. Moreover, video is not only a mass-media vehicle, but one that has been addressed along with computer games, mechanical toys and alternative visual mediums as being preferential tools for teaching children with autism much needed social-emotional-based skills.

Capitalizing on Children with Autism's Affinity for Mechanical Games and Visual Mediums

The interest of individuals with autism in regular patterns and order relates closely to their preferences for computer games, mechanical toys, and math puzzles (Barakova et al., 2007). Computer games must be flexible enough to adapt to the personal data, world and belief system of a child with autism (Schaba et al., 2005). Mechanical toys offer repetitively moving parts, the feeling of being in control and predictability, all of which are key ingredients that make mechanical toys an appealing medium for children on the spectrum.

Barakova et al. (2007) sought to capitalize on children with autism's preferences for regular patterns, order and mechanical toys by creating an intelligent toy which uses cubes, changing colors and emergently changing behavior to stimulate communication and other underdeveloped behaviors and social skills of children on the autism spectrum. The researchers encouraged exploratory behavior, awareness of self and turn-taking through an affordable, universal, stimulating, interactive and intelligent toy. Barakova et al. (2007) discovered that children with autism had a strong preference for spending free time on games rather than on strictly educational programs. Additionally, the authors learned that games for children on the spectrum should not be over-stimulating (they should focus on one sense at a time), should be structured and logical and should encourage novel behavior or the incorporation of another individual into the game (Barakova et al., 2007).

A variety of studies have sought to capitalize on the affinity and success of computer games and mechanical toys with children on the spectrum by utilizing these forms as mediums through which to teach emergent behaviors and important social skills: two clear impairments of children with autism. Barakova et al. (2007) introduced the notion of a multi-agent system—a system comprised of multiple autonomous parts with the following criteria: each agent has an incomplete ability to solve problems independently, no global system control, decentralized data and asynchronous computation. These systems offer self-organization and development of complex behaviors despite following simple rules. One or more rules constitute a relationship to the other agents—multiple agents system-which expresses emergent behavior. This organization parallels the communication among individuals with their own communication systems, complex patterns, norms and rules. These multi-agent systems are likely to be appealing to individuals with autism due to the patterning, structure and the opportunity for full and direct control over the system.

Schaba et al. (2005) introduces an interactive model based on a multi-agent system between children with autism and a system taking expert directions. It affords the analysis of children's behavior via their actions. The "expert" defines an individualized activities plan which is a series of educational games catered to children with autism. Finally, the "expert" is able to observe the user's particular actions via camera, touch screen, mouse or keyboard and thus to interface with the user and the activities of the protocol to help rehabilitate specific behaviors of the user. This proposed Autism Project was geared at employing a User Observation Agent (UOA) to observe the child's actions through behaviors and through words describing behavior. The software/hardware FaceLab, however, measures three-dimensional

representations of the face and the orientation of the gaze (Schaba et al., 2005).

In addition to the use of multi-agent systems to appeal to the structure, patterning and control preferences of children with autism, researchers have proposed employing Kismet and Robota dolls in an effort to teach imitation and further social-emotional skills via preferred mediums to children on the spectrum. Kismet is a humanoid face which creates expressive social interactions with "human caretakers," with the hope of generalizing social relationships between the robot and human (Schaba et al., 2005). The Robota Doll is a 45 cm high humanoid robotic doll designed as an interactive toy to determine how a human could teach a robot to utilize imitation, speech and gesturing skills. Robota can react to touch through its body which is composed of electronic boards and motors that drive the arms, legs and head (Billard, 2003). Robota has a serial link connected to a PC, which can apply speech synthesis and the video processing of data to copy the outward and sideways movements of the users' arms and head when the individual sits directly across from it.

Dautenhahn & Billard (2002) utilized Robota to stimulate social interaction skills including eye gaze, touch, and imitation skills in children with autism, who struggle with establishing proper eye-contact, social interaction, social communication, and imaginative skills and rarely participate in interactive games. Imitation plays an integral role in the acquisition of social cognition and communication skills, allowing an infant to establish bonds with others (Dautenhahn & Billard, 2002; Nadel et al., 1999). Some researchers suggest that individuals with autism struggle with imitation while others suggest that they are capable of partaking in immediate imitation of familiar actions (Robins et al., Rogers and Pennington, 1991; Hammes and Langdel, 1981). Nadel (1999) discovered a significant correlation between imitation and positive social behavior suggesting that imitation is predictive of social capabilities in individuals with autism. Moreover, individuals with autism demonstrated improved social responsiveness when their own actions were being imitated (Dautenhahn & Billard, 2002; Dawson and Adams, 1984).

The researchers initially utilized a camera system to fully analyze the arm movements of the children to ensure that Robota could imitate the child and to encourage the children to imitate Robota. The study was conducted with children between the ages of 5 to 10 from the Enhanced Provision unit of Bentfield Primary School in Essex, UK. The robot was connected to a laptop and laid atop a table against a wall at the side of the room. Two cameras were placed in the room; one to observe the area in front of the robot and children when addressing the robot and the other behind the robot, in an attempt to observe the facial expressions of the child during their interaction with the robot. Sessions were typically fewer than three to five minutes in duration and children were placed into one of three setups. In Setup A, children observed a "dancing robot" in a box, moving to prerecorded music in order to familiarize the children with the robot. In Setup B, the robot was removed from the box and the carer demonstrated how to move the robot and actively encouraged the child to play with the robot. This "puppeteer robot" was manned by the investigator, who ensured that the robot was accurately imitating the child's arm, leg and head movements, even when the child was not facing or close to the robot. In Setup C, the children were not given any encouragement or instructions, but the robot in "puppeteer mode" would respond to even subtle movements of the child and introduced role-switching and a simple imitation game. The researchers evaluated the following behaviors: eye gaze towards the robot, touching the robot, direct, delayed or attempted imitation of the robot, and the child's proximity to the robot (Dautenhahn & Billard, 2002).

The results suggest that the children significantly increased their scores for proximity, eye gaze and imitation over the course of the intervention. With respect to social interaction skills and turn-taking, the children demonstrated more

frequent interactions with the adults in the room either via the robot or separately. Overall, the children utilized the robot as a mediator, or as an object of shared attention with their teachers and were able to include the investigators and carers into their worlds (Dautenhahn & Billard, 2002).

ISSUES AND LIMITATIONS

Based on the high prevalence of **autism spectrum disorders** and the pervasive effect of autism on the family unit, on peers and on other key microsystems of the child with autism's life, this chapter addresses two principal limitations in the current intervention literature: 1) the failure of video interventions to successfully promote positive **behavioral intentions**, **attitudes** and **sensitivity** of typical children towards children with autism and 2) the need for further therapeautic tools to effectively teach appealing and generalizable social skills to children with autism. The following section highlights these limitations and the subsequent section provides ideas for initial solutions to these obstacles by consulting video modeling, video self monitoring, and social stories literature.

Limitations of Video Interventions Promoting Sensitivity

While numerous studies have employed video technology to teach about a particular disability in the hopes of teaching typical children how to be more sensitive and accepting of children with special needs, few of these video interventions have proven fruitful. Video interventions have either been characterized as harmful (Siperstein & Bak, 1980; Swaim & Morgan, 2001), unhelpful (Friedrich, Morgan, & Devine, 1996) or minimally helpful (Campbell, Ferguson, Herzinger, Jackson, & Marino, 2004) for increasing the sensitivity and positive behavioral intentions of typical children towards children with disabilities. Thus, a successful paradigm for a sensitivity training video tool is needed, since the potential of programming has not been adequately tapped. A video tool which would promote sensitivity of typical children towards children with autism could achieve three aims: 1) prevent the ostracism of peers with autism and promote the interest of typical peers in interacting with them, 2) enhance the social and empathic development of typical children by exposing them to peers with differing needs, and 3) offer children with autism more social skills training by encouraging typical children to interact with them.

Limitations of Therapies in Teaching Children with Autism Appealing and Generalizable Skills

While a video sensitivity training tool may indirectly promote the social skills development of children with autism, a variety of therapies are geared towards directly teaching children with autism valuable social-emotional skills. A number of behavioral therapies have shown success in teaching children with autism how to effectively function in everyday life and how to participate to a greater extent in family life, schooling, and socializing with peers. However, treatments are not yet successful in fully teaching complex behavior sequences necessary for positive interactions and the development of true friendships. Current therapies, of which Applied Behavior Analysis (ABA) is one of the most common, impose severe time demands on the child and family. While somewhat successful, ABA may be tedious for the therapist and unappealing, repetitive or aversive for the child client with autism. Moreover, the generalizability and usefulness of what is taught may be limited. One-on-one therapy may not adequately prepare children with autism for the fast-paced and fast-changing world of social relationships characteristic of three to 10 year-olds.

These two limitations or boundaries will be addressed in the following section. The failure of information from previous video interventions to improve the reactions of typical peers towards

children with autism will be considered and alternative forms of information will be introduced to try to enhance the efficacy of these video tools. Moreover, more appealing modes of teaching social and life skills through multimedia forms to children with autism will be discussed rather than relying on behavioral methods which may be unappealing and may lack generalizability.

SOLUTIONS

Tackling Boundary 1: Video-Based Sensitivity Training

Prior studies have attempted to promote positive behavioral intentions and cognitive attitudes of typical children towards children with physical disabilities (Morgan, Biebrich, Walker & Schwerdtfeger, 1998; Sigelman, 1991), obesity (Bell & Morgan, 2000), Tourette's syndrome (Friedrich, Morgan and Devine, 1996), autism (Swaim & Morgan, 2001) and other disabilities through a video medium. All of the aforementioned studies, which presented descriptive information about children with autism, appeared harmful, neutral or minimally helpful at improving typical peers' positive intentions and attitudes towards children with disabilities. **Descriptive information**, based on Heider's (1958) cognitive consistency theory, offers information relating to the similarities between a child with a disability and his/her typical peer. The notion is that typical peers will be more accepting and more interested in socially interacting with a peer with disabilities, if he/she appears similar to the typical peer.

To expand upon descriptive information, Campbell et al. (2004) added explanatory information to descriptive information in order to determine if explanatory information would help promote more positive intentions and attitudes of typical students towards peers with autism. **Explanatory information**, which is based on the social attribution theory (Kelley, 1967; Heider, 1958), offers causal information about a disorder. Including **explanatory information** is partially based on research suggesting that typical peers will be more accepting and will show more positive intentions towards children with autism if they believe children with autism possess low responsibility for their disorder (Juvonen, 1992). In contrast, if typical peers attribute high levels of responsibility and blame to their peers with autism for their condition, typical peers are more likely to show anger and more negative intentions and attitudes towards children with autism (Juvonen, 1992).

Campbell et al. (2004) discovered that adding **explanatory information** to **descriptive information** increased the positive attitudes of younger children towards children with autism. Despite the success, however, of combining explanatory and descriptive information for younger children (third and fourth graders), older children (fifth graders) failed to show a significant increase in positive behavioral intentions towards children with autism following the combined video information. An earlier study demonstrated the same trend for age. In a sample of 184 younger (third and fourth grade) and older (fifth and sixth grade) elementary school children, Bell and Morgan (2000) found that younger children assigned less blame, gave higher ratings to, and expressed more willingness to engage in academic activities with an on-screen target child with obesity than older children. These findings are in line with studies suggesting that **cognitive attitudes** towards individuals with disabilities appear to become more negative as children progress from childhood to adulthood (Ryan, 1981). Thus, **sensitivity** interventions show promise, but further research is needed to determine how best to teach disability awareness, sensitivity and positive attitudes to older, typical children.

To improve upon the descriptive and explanatory information used in previous video interventions, Silton (2009) conducted a random assignment, experimental study by incorporating peer strategies and strengths information to demonstrate the additive benefit of presenting

alternative forms of video-based information to enhance typical children's knowledge, positive **behavioral intentions** and **cognitive attitudes** towards children on the autism spectrum. Silton (2009) based her use of **peer strategy information** on social learning theory (Bandura, 1977), which suggests that individuals will learn behaviors if the behaviors are properly modeled and reinforced, and self-fulfilling prophecy (Rosenthal, 1963), which suggests that a perceiver's expectations & behavior will provoke the responses of others. Rather than solely relying on descriptive and explanatory information, Silton (2009) believed a more hands-on interactive approach, whereby typical peers could be taught actual **peer strategies** to contend with the odd or repetitive behaviors of children with autism may enhance typical peers' positive intentions or interest in interacting with peers on the autism spectrum. These **peer strategies** were created based on successful studies relating to peer networks (Disalvo & Oswald, 2002), pivotal response training (Pierce & Schreibman, 1995), peer-mediated interaction (Goldstein et al., 1992) and peer mentors (Odom &McConnell, 1993; Strain & Odom, 1986).

Moreover, Silton (2009) asserted that incorporating **strengths information**, rather than solely relying on deficit-based information on autism, may inspire typical peers to learn more about their peers with autism. Silton (2009) based her inclusion of strengths information on the affect/effort theory (Rosenthal, 1963), which suggests that more positive expectancies will encourage greater affect and effort.

If a typical peer perceives that a child with autism possesses special strengths or abilities rather than solely possessing deficits, the typical peer may exert more effort in attempting to socially interact or in getting to know his peer on the autism spectrum. Additionally, a previous study suggested that offering strengths and preference information about children with autism coupled with peer strategies information, greatly enhanced the social initiations and responses of both the typical peers and the peers with autism, alike (Owen & Deschryver, 2004). Savant abilities, superior and perceptual abilities and a special connection to animals were all highlighted in the strengths information section of her study.

The findings in the Silton (2009) study suggested that adding peer strategies was especially useful for enhancing typical children's **behavioral intentions** as measured by the Shared Activities Questionnaire (SAQ; Morgan et al., 1996), a behavioral intentions measure, while strengths information appeared to be minimally helpful in increasing typical children's **cognitive attitudes** towards children with autism as assessed by the Adjective Checklist (ACL; Silperstein, 1980, Silperstein & Bak, 1977). Both peer strategies and strengths information appeared helpful for enhancing the knowledge typical children have of children with autism. Each video tool in the study was distinctively created to incorporate descriptive and explanatory information and these two alternative forms of information, peer strategies and **strengths information**: Video 1 (AUT-D+E [Autism-descriptive + explanatory]; descriptive and explanatory information), video 2 (AUT-D+E+ Peer Strategies; descriptive, explanatory and peer strategies information), video 3 (AUT-D+E+ Strengths; descriptive, explanatory and strengths information) and video 4 (AUT-D+E+ Peer Strategies + Strengths; descriptive, explanatory, peer strategies and strengths information). Thus, the partial success of these alternative forms of video-based information, suggest that previous video-based sensitivity interventions may be enhanced through the incorporation of alternative forms of video-based information.

In addition to these encouraging findings, Silton (2009) uncovered an intriguing and unanticipated finding in the process of creating the video tools for her sensitivity study. The actors in her videos, those assuming the roles of the male and female target children with autism and those playing the peers of the target children with autism, appeared to develop a significant interest in autism over the course of producing the video tool. The actors asked a plethora of questions and

were anxious to practice their new skills with a child on the spectrum. Silton (2009) suggested that rather than solely focusing on sensitivity, future research could track changes in knowledge, intentions, attitudes, empathy and self-concept of the actors in the process of the video creation from time 1 (prior to the video creation) to time 2 (following the video creation). With the continued use, appeal and success of video and digital media with children (Blumberg & Ismailer, 2008), video interventions which encourage children to play the role of an individual with a disability or the sensitive peer of an individual with a disability, may be particularly powerful in enhancing the interest and sensitivity of typical elementary and middle-school aged children towards children with autism and other disabilities. Thus, it is important to review how best to teach social and life skills to children with autism through video both to directly teach children with autism hallmark social-emotional skills, and to determine how best to both enhance the sensitivity of typical children towards children with autism and how to benefit typical children in the video-making process.

Tackling Boundary 2: Video Modeling, Self Modeling and Social Story Interventions

Video modeling and video self modeling have recently been introduced as potential tools which may be more successful for teaching complex social behaviors by offering flexibility and appeal, which are necessary for positive social interactions. As developmental psychologists, we want to stress how important it is that children with autism socialize with typically developing peers as a condition for their own development. We suggest that video technologies can improve upon current therapies, especially Applied Behavior Analysis (ABA), by creatively addressing the issues of stigmatization, the lack of appeal of varying therapies for child clients, and the lack of generalizability or usefulness of the learned behaviors for success in social interactions. In addition, we see the great potential of using video technologies educationally to enhance the sensitivity and social abilities of typically developing children and to promote the interaction of typically-developing peers with social-emotionally challenged peers, in order to address issues of stigmatization and generalizability.

Video Modeling and Video Self Monitoring

Video modeling produces a wide range of social, communication, and academic benefits for children with disabilities (Sturmey, 2003). Based on Bandura's (1977) observational learning and modeling theory, video modeling should enhance children's communication skills and decrease problem behaviors by encouraging them to model behaviors of those around them (Charlop-Christy & Daneshvar, 2003). Video modeling has been utilized to teach and improve upon a variety of play, social and life skills. Teaching imaginative play skills among three play categories including a tea party, shopping and baking helped children with autism rapidly learn complex verbal and motor sequences from video modeling tapes without the use of error correction procedures or experimenter-reinforced contingencies (D'Ateno, Mangiapanello, & Taylor, 2003). Perspective-taking skills, skills that are often absent or deficient in children with autism, were also successfully taught through video modeling (Charlop-Christy & Daneshvar, 2003). Moreover, recent studies at Indiana University suggest that video modeling may help improve the social skills and activities of daily living skills (ADLs) of children and adolescents with autism: chiefly their functional skills, followed by their social communication and behavioral functioning skills (Bellini & Akullian, 2007). Finally, Model Me Kids, an organization headed by Susan Klein, attempts to disseminate video modeling on a broader scale, by producing video-modeling based teaching tools for children with autism, Asperger syndrome, Pervasive Developmental Disorder-Not Otherwise Specified

and Nonverbal Learning Disorder. While these videos appear to effectively break down social-skills into digestible segments, they may benefit tremendously by exploring the field of digital media and gaming.

Video self modeling (VSM) takes observational learning and modeling a step further by affording individuals the opportunity to observe and then act on their own behaviors. VSM includes imitation of one's desirable behaviors captured on videotape, edited, and played back. While over 150 articles on VSM have been published utilizing thirty years of Bandura's modeling research, VSM has only recently been used to aid children with autism with language and social-communication skills. Several studies show the effectiveness of video and VSM in enhancing vocabulary (Zihni & Zihni, 1995), imaginative play (D'Ateno, Mangiapanello & Taylor, 2003), spontaneous request behaviors (Wert & Neisworth, 2003) and perspective-taking skills (Charlop-Christy & Daneshvar, 2003).

Interventions employing video self monitoring (VSM) have been used with children on the autism spectrum and have been found to be effective for those children who already had established preferences for video (Scherer, Pierce, Paredes, Kisacky, Ingersoll, & Schreibmen, 20001). While the aforementioned study and others report positive findings for small samples of children with autism, Bellini and Akullian (in press) conducted a meta-analysis of video modeling featuring 23 studies with a total of 73 participants. The median number of intervention sessions was nine; results showed rapid changes in target social skills, more often positive but sometimes negative. The rapidity of the change suggests that video monitoring and VSM are potent therapeutic and educational strategies. In addition, their results showed that both video monitoring and VSM are effective for improving social skills of young children with autism when interacting with adults. Bellini, Akullian, and Hopf (2007) conducted an intervention study which involved presenting VSM videos to two preschool children with autism. The preschool children were challenged to watch themselves in peer interactions without adult prompting. Videos were created in the context of the preschool over three days with the teacher prompting both the child with autism and his peers. Videotapes were then edited, and the teacher and all ineffectual interactions were removed. Involving typical peers, rather than solely relying on teachers to model appropriate social interactions, affords children with autism a natural context for learning, since it precludes the further steps needed to transfer learning to interactions with peers (DiSalvo & Oswald, 2002; Rogers, 2000). The intervention occurred almost daily for four weeks (total 17 days). After each child viewed his own video, he was introduced to thirty minutes of unsupervised play, which was observed by the researchers. No prompts were given during the observation periods. Both children increased their social engagement from baseline lows of 3 and 6% to highs of 43 and 24% during the observation phase which was maintained when VSM stopped for the two following weeks. The teacher's reaction to the ease of implementation and effectiveness of VSM was very positive. As we stress, Bellini et al (2007) point to the negative effects of social isolation on the overall development of young children with autism.

The results of this study, rapid changes in social engagement with young children and the ease of the intervention, point the way to viewing VSM as an educational as well as a treatment tool—to blurring the lines between treatment and education allowing children with autism to be truly educated in the same classrooms as their typically developing peers. Firstly, blurring these lines decreases stigmatization and secondly, creating an intervention tool which effectively increases social engagement in the complex situation of unsupervised play, demonstrates remarkable generalizability and flexibility of skill use with different people (children in the classroom) for a rather extended amount of time (30 minutes).

Nikopoulos and Keenan (2007) conducted research that specifically examined the relationship of successful social engagement including initiation with the number of social interactions included on videos made for four six and seven year old children with autism in the context of their school. The videos depicted a 10 year-old child with learning difficulties initiating a sequence of social activities that he and an adult engaged in together. Videotapes, about thirty seconds long, demonstrated initiation and three behaviors built up from one to three as well as a sequence of three novel behaviors. Intervention sessions were five minutes in which the child viewed the videos and then imitated the behaviors and initiated a social activity he saw with his own teacher. The videos were created and intervention sessions were conducted in the same room with the same toys and chairs. Both a generalizability session with a typical 11 year-old peer and one and two month maintenance sessions were held. Similar to the previous study, this study showed rapid positive changes in 9 to 24 sessions. Video modeling effectively built novel skill sequences using three behaviors sequences which were not targeted in previous training. Although the children initiated less than they imitated, when they did initiate, the levels of genuine reciprocal play increased substantially. Moreover, these levels generalized to another peer and were maintained in long-term follow-up sessions. In addition to demonstrating that education can serve as treatment, this study also demonstrates that children with autism learn to learn, a hallmark for successful adaptive learning. The children's effectiveness for modeling the sequence of novel behaviors shows that they used the video as a learning tool over time.

Video modeling and VSM draw on the visual strengths often seen in children with autism (Tissot & Evans, 2003). For instance, children with autism were found to have an islet of ability on a visual, Embedded Figures Task compared to individuals with mental retardation and typical controls (Shah & Frith, 2006). Despite these visual strengths, however, a recent study noted that children with autism exhibit abnormal patterns of social visual pursuit since they tend to focus on mouths, bodies, and objects rather than on the eye region of an individual's face, the key location for inputting social messages. Thus, the amount of time fixated on mouths and objects rather than on the eye region of the face are strong predictors of the individual with autism's degree of social competence (Klin et al., 2002). The video modeling procedure we will employ in this proposal will attempt to capitalize on the visual strengths and preferences of individuals with autism while also encouraging them to focus on the most socially valuable region of the face, the eye region. Videos do not require prior training nor do they demand prerequisite skills, especially language or picture-to-picture or picture-to-object correspondence abilities. Individual studies and a meta-analysis provide evidence that children with autism seem to: a) find this form of treatment or education appealing and enjoyable, b) learn more complex behaviors, c) initiate social interactions, albeit at rather low frequencies, d) use the skills they learned with peers in unsupervised play, and e) learn rapidly with videos. Together, these results strongly suggest that children with autism can learn to learn - the hallmark of adaptive successful learning and living - and that video modeling and VSM are potent forces for opening the social world to children with autism, helping them get on track and stay on track developmentally. Despite the effectiveness of video self modeling (VSM), employing VSM for observational learning has yet to reach the mass video and gaming market.

Multimedia social stories are another form of effective instruction which could be more successfully produced on the mass-market. Hagiwara, Myles & Smith (2002) developed a multimedia story by employing HyperCard [supTM] (Apple Computer, 1994) software. This program utilized a book-like format, which contained a text of social stories; videos of participants' actions corresponding to social story sentences; audio with read aloud sentences utilizing a synthesized computer voice; and a navigational button for use

by the participants. The researchers thus utilized computer technology and a film of participants in action to teach children with autism social-emotional skills. Gray (1994), Gray and Garand (1993), and Swaggart et al. (1995) suggested that social stories are one method to teach children with developmental disabilities appropriate social behaviors and interactions in order to enhance their success in academic and work settings. This instructional technique is thought to ease the confusion of verbal instructions and social interactions for individuals with autism (Gray & Garand, 1993) through the use of icons or symbols connected to short sentences in a small book format. Icons aid students in recognizing stories because previous research suggests that many students with autism are visual learners. A **social story** elucidates social situations in terms of relevant cues and identifies appropriate responses for individuals to make. The typical framework of a social story is comprised of two to five sentences that are (a) descriptive, including information about the setting, participants and actions, (b) directive, including statements concerning appropriate behavioral response, (c) perspective, describing feelings and reactions of others in the targeted situation, and (d) control, offering analogies with similar actions and responses utilizing nonhuman subjects (Gray, 1994; Gray & Garand, 1993). In short, specific guidelines for writing social stories include the "who, what, when, where and why," of a given situation (Lorimer, 2002).

The method of multimedia social story interventions elaborates social situations in terms of relevant cues and appropriate responses. Studies show the benefits of written social story interventions (Gray & Garand, 2001; Lorimer, 2002) as well as multimedia social story interventions (Hagiwara et al., 1999) for promoting social behavior and decreasing tantrum behaviors of children with autism. Since the latter study was the first of its kind in the special education literature and since a small sample size was utilized, this section describes ways to improve current research methodologies and designs by generating video or gaming-based multimedia social story interventions. While Gray and Garand (2001) advised that social stories be presented on a single piece of paper without the use of visual stimuli, social stories coupled with icons, and gaming features can offer visual support to enhance comprehension.

Hagiwara, Taku, Myles and Smith (1999) demonstrated the potential additional benefits of presenting **a multimedia social story** intervention rather than solely relying on a written social story intervention for young children with autism. Unfortunately, while only one of the three children in their study generalized their improved social behavior across environments, each child in the study benefited in some substantial way from the multimedia social story intervention. Potential reasons for the variability of children's results are likely due to the variability in the duration of the intervention, individual differences among participants, the nature of the target behaviors, consistency in educational environments and differing levels of enthusiasm for viewing the multimedia social story program. Since this study was the first of its kind in the special education literature and since such a small sample size was employed, there is clearly room for improvement of both the methodology and design of the multimedia social story intervention, itself (Hagiwara, Taku, Myles, & Smith, 1999).

In a more recent study, Lorimer (2002) utilized social stories in an ABAB single-subject design to reduce precursors to tantrum behavior in a home setting with a five-year old child with autism. Tantrums occurred five of seven times in the initial baseline period, whereas tantrums decreased on the sixth and seventh day with the introduction of social stories and returned to two to three times per day when the social stories were removed. When the social stories were reintroduced, the child's precursor trends toward tantrum behavior again showed a downward trend (Lorimer, 2002). Thus, the use of social stories, has clearly demonstrated some utility in both aiding with social behavior and decreasing tantrum behaviors in children with autism.

The following theory-based proposals reveal initial steps towards developing successful video modeling, video self-modeling and multimedia social-story-based tools with significant gaming features, in order to best maximize the visual, video, computer and mechanical preferences of children on the autism spectrum. Silton, the first author, is currently in the process of developing the following gaming tools.

FUTURE RESEARCH DIRECTIONS

Future research should consider the alternative forms of information which may enhance the success of video and gaming tools in promoting the sensitivity of typical children towards children with autism and various ways in which to make video modeling, self modeling and social story tools more appealing and successful in teaching social, play and daily living skills to children with autism. Silton (2009) is currently embarking on the following video game proposal, which is an attempt to offer appealing and effective video tools for transmitting key social and life-skills information to children with autism.

Pre-game Setup and Background

The child player with autism is paired with a typical sibling or peer player. Please note: If no other player is available, the child with autism can select a playmate from the video game to serve as his/her model. Each child selects a video game character from a list of characters. Following his/her selection, a digital camera situated above the TV screen will take a head shot of each participant. The head shot will then be superimposed on the video game character so that each participant will view him or herself on the screen, albeit with a cartoon character body. This self-shot will allow for video self modeling to take effect. The entire game sequence will thus utilize video modeling and video self modeling as a rudimentary form of learning. Additionally, multimedia social stories will form the backdrop of this video game series since children with autism and their typical peers will be accomplishing a variety of activities of daily living (ADLs) (Levels 1-3) and social-emotional skills (Levels 4-5) through social stories in a multimedia, video game format.

The intention during the game is to have the typical child start the game first and have the child with autism follow. This will hopefully accomplish two goals. First, the child with autism will be able to practice modeling by seeing what the typical child does and imitating it. Moreover, by playing the game along with the child with autism, the typical child might learn to foster sensitivity towards his or her atypical counterpart; better appreciating the strengths and limitations of a child on the spectrum. Ideally, the game would be played in a virtual reality style so that both children would actively perform the necessary tasks while simultaneously visualizing themselves on screen. In this sense, not only is the child with autism able to accomplish video-modeling by imitating his or her model, but he is also able to perform self-modeling since he can view himself on-screen as well. If the virtual reality task is too difficult to perform each child will, alternatively, simply click on the screen with a mouse to lead their character into performing the necessary tasks.

LEVEL ONE

Level 1A

Level 1A entails the child preparing himself for a typical day. The ultimate goal is to leave the house on time to catch a bus to school. Level 1A involves rising from bed and performing tasks in the bathroom (such as voiding, brushing one's teeth and washing one's face). After exiting the bathroom and successfully, performing all of the necessary tasks, both children would advance to Level 1B. It is important to note, however, that the children can only advance to the next level if **both** of them successfully complete the tasks of Level 1A.

Level 1B

In this Level, the children must dress themselves correctly for a day at school. They must select appropriate undergarments, shirt, pants, socks and shoes from a drawer or closet in a bedroom. If the child selects an inappropriate garment, the article of clothing will automatically be removed from the character's body and will be returned to the drawer from which is was taken. The child will then have to select the correct item. This will be repeated until both children select appropriate and complete outfits to wear to school. Once both children leave their bedroom dressed properly, they will advance to level 1C. For less advanced players with autism, an option could be to have a pre-selected outfit for the child, which the child is only required to click onto his character's body and the child need not select his own outfit.

Level 1C

This is the final stage of the first level. Now that the children have dressed themselves they must proceed downstairs to eat breakfast, take their school bag and find their bus to school outside. As in level 1B, this level could also have multiple options, depending on the level of functioning of the child with autism. For those children on a lower level of functioning, breakfast could be prepared in advance and the child would simply have to eat it with the appropriate utensils. For those children who are higher functioning, the task could involve pouring a bowl of cereal with milk along with a glass of orange juice and, as with the previous option, eating it with the correct utensil. In either case, the child would be required to place his dirty dishes properly in the sink, grab his backpack and lunchbox for school and proceed to the door and to the school bus waiting outside. As in the other levels, the children can only successfully proceed to Level 2, if **both** children complete Level 1C.

LEVEL TWO

Level 2A

In the beginning of Level 2A, both players will appear in a supermarket. The game begins by challenging the participants to locate shopping carts to begin their grocery shopping. The players are then given a list of items which they have to purchase. Each item has an icon to denote in picture-form what the item is. For instance, individual pictures of an apple, a juice, a cereal box and vegetable will appear on their list. Each time an item is appropriately selected and placed into the shopping cart, the character will receive a check on his/her shopping list. Once all of the four grocery items are selected, the children can proceed to Level 2B.

Level 2B

The players, who have now selected all of their grocery items, are ready to wait in line to purchase their items. In Level 2B, each character will find himself in an empty check-out line. He will have to wait until the cashier is ready. Each character has a wallet in his pocket with one, five and ten dollar bills and with a few coins. Once the cashier gives the total cost of the item, the character must select the correct number of bills to purchase his grocery items. Those who are at a lower level of functioning can simply click on the help button which will visually display the exact bills and coins that are required. Children who are more high-functioning can select the proper bills with no visual support. Once the items are correctly purchased, the characters can proceed to Level 3.

LEVEL THREE

Level 3A

Level 3A prepares the child for post-school activities. Similar to Level 1C, the player will have to prepare for another meal of the day. For those children on a lower level of functioning, dinner could be prepared in advance and the child would simply have to eat it with the appropriate utensils. For those children who are higher functioning, the task could involve setting the table in the appropriate fashion, ensuring that they have a protein, carbohydrate and vegetable on their plate. The player will receive a beverage option and three levels of food icons: protein (meats, fish), carbohydrates (rice, pasta) and vegetables (peas/carrots, salad) and will have to ensure that one item from each category is placed on his/her plate. The child will then proceed to eat his/her virtual food with the appropriate utensils. The child would then be required to place his dirty dishes properly in the sink. The child could then proceed to Level 3B.

Level 3B

Players have the option of selecting a bath or shower for Level 3B. The player will select undergarments, pajamas and a towel from a drawer set which will clearly label these items in written and picture form. The player will then remove his upper and lower garments and prepare for his bath or shower. A meter will note the heat of the water. The player will choose the appropriate temperature and will select the proper bathroom items for use. The player will select the shampoo for his hair and soap for his body. The game will break the body into three parts; the upper, middle and lower parts of the body. The player will be required to comprehensively wash all three areas of his/her body. Once this is accomplished, the player can turn off the water and use the towel he selected to dry himself off. He can then select the undergarments and then pajamas. Players who have successfully washed (bathed or showered) and dressed in undergarments and pajamas can proceed to Level 3C.

Level 3C

Finally, the player is ready for bedtime. Bedtime preparations will require that the child brush his teeth, pour himself a cup of water for the night, select a book and cuddle up in bed for the night. The player will need to appropriately accomplish each aspect of toothbrushing, from selecting a toothbrush and toothpaste from the cabinet, to placing the toothpaste on the toothbrush and brushing in the appropriate places for one minute. A clock on-screen will denote when "one minute" has elapsed. The player will then rinse his mouth out, clean and then dry his toothbrush and place both the toothbrush and toothpaste back into the cabinet. Once he has accomplished toothbrushing, he will pour himself a cup of water for the night and will select a book from a large bookshelf for the night. Once he selects a book, he will enter his bed and place the covers over his body for a good nights' sleep.

LEVEL FOUR

Level 4 (A Variety of Emotion Recognition Scenarios)

Level 4 introduces a variety of scenarios involving emotion recognition skills. The players are required to label which emotions would be most relevant to a variety of scenarios. For instance, if a child receives an "A" on a paper, the player will be required to click on the happy/elated smile icon. A child, who is poked fun of in-class, will most likely click on the "embarrassed/blushing icon." A child who has lost a game might select a "sad/muted icon." Finally, a child who unexpectedly views a large animal may click on the "startled/fear icon." Level 5 affords the child an opportunity to accurately recognize and utilize appropriate

emotional reactions to common life events. Emotion recognition impairments account for a large percentage of the hallmark social deficits most apparent in autism spectrum disorders.

LEVEL FIVE

Level 5 (5A-Classroom, 5B-Lunchroom, 5C-Playground):

Level 4 places the players in the classroom, in the lunchroom or in the playground at school. Level 4 not only involves activities of daily living, but social interactions the child with autism will experience in the school environment. The player must appropriately contend with a variety of situations in the school environment in order to progress to Level 5. Again, he is capable of modeling the social behaviors of his typical peer, sibling or alternatively a character he selects on the game to gain an initial notion of how to manage these social situations.

Take Home

The appeal of computers, mechanical toys and video games for children on the spectrum make this proposed video game product an especially exciting venture. This video game product will capitalize on the strength and success of imitation, modeling, self-modeling and multi-media social story interventions to create an engaging and interactive virtual atmosphere wherein children on the spectrum can learn key activities of daily living (ADL) skills, and key social interaction and emotion recognition skills for use both within the home and school environments. The boon of including a typical peer and/or sibling into the gaming environment offers two further levels of learning, whereby the child with autism can model key social-emotional and daily living skills from his typical peer or sibling and his typical peer or sibling can gain key knowledge, sensitivity and tolerance skills towards his peer on the autism spectrum.

In considering the efficacy of a video game which employs aspects of video modeling, video self modeling and multimedia social story interventions, it is useful to determine: a) whether or not viewers with autism, who are imitating proper social skills and behaviors, will repeat these behaviors in the future and b) whether or not the typical players, who are modeling the proper social skills and behaviors, will show increased social skills and sensitivity and understanding about the disorder, due to their modeling. Do the encouraging and positively-reinforcing external cues present in the video game after passing each level, help children with autism internalize these emotional experiences? Would video games incorporating these modeling and self-modeling features help viewers with autism generalize activities of daily living or express overt facial expressions, which would then translate into more internalized experiences of emotions? Do the typical players modeling appropriate, initial behaviors in the video game, gain further social skills from this modeling and take a greater interest in peers with autism, who may be less capable of exercising typical social skills and behaviors?

With respect to sensitivity videos, if players (who are selected to display positive social skills) are encouraged to demonstrate positive behaviors and to smile and show encouragement while they are interacting with the target on-screen child with autism, is it plausible that these reactions would generalize towards their treatment of actual children with autism? Would the expressive output of facial movements they employed to model behaviors and to exhibit positive behaviors, sensitivity, and tolerance towards the on-screen child with autism translate into a transformation in their true inner emotional experiences and autonomic responses towards real or in-vivo children with autism? Following the creation and implementation of the proposed video game, significant research studies will ensue to answer the aforementioned inquiries.

CONCLUSION

Typical peers and children with autism may significantly benefit from both observing and modeling proper behaviors and interactions through a gaming medium. Creating video modeling or game-based sensitivity tools may enhance typical children's actual reactions towards children with autism through practicing effective peer strategies to utilize with children on the autism spectrum. Additionally, knowledge of potential **strengths** of children with autism may increase their effort and willingness to interact and spend time with children on the autism spectrum.

Children with autism may benefit from increased social exposure if typical peers are more willing and eager to socially interact with them and may appreciate increased tolerance and understanding of typical peers towards some of their disorder-based struggles. Additionally, children with autism may benefit directly from gaming based on video modeling, video self modeling and multimedia social story interventions. Learning and observing proper social, play and life skills in an appealing manner, rather than solely relying on rote behavioral therapies which lack generalizability, may help children with autism advance their social-emotional skills, the key hallmark deficit in autism.

If the research community could effectively utilize this contemporary video game tool to disseminate their research-based findings in an effective and appealing manner, many more individuals, families and peers affected by autism and other disorders, could benefit tremendously from this technology. These tools could help promote tolerance and learning in an engaging way and would thus benefit schools and families, who are educating and raising typical and atypical children, alike. Moreover, these tools would offer much richer research methodologies for tracking and understanding important micro-developmental changes in daily and weekly interpersonal skills development among both typical and atypical children. We must all foster sensitivity and understanding in our children and we must galvanize each other to pull our precious peers, siblings and family members with autism out of their lonely corners.

REFERENCES

Adelmann, P. K., & Zajonc, R. (1989). Facial efference and the experience of emotion. *Annual Review of Psychology*, *40*, 249–280. doi:10.1146/annurev.ps.40.020189.001341

Autism Speaks. (2006). Retrieved December 2, 2006, from, http://www.autismspeaks.org

Autism Speaks. (2007). Retrieved September 9, 2007, from, http://www.autismspeaks.org

Bagenholm, A., & Gillberg, C. (1991). Psychosocial effects on siblings of children with autism and mental retardation: a population-based study. *Journal of Intellectual Disability Research*, *35*(4), 291–307.

Bandura, A. (1977). *Social Learning Theory*. Englewood Cliffs, NJ: Prentice Hall.

Barakova, E., van Wanrooij, G., van Limpt, R., & Menting, M. (2007) Using an emergent system concept in designing interactive games for autistic children. Interaction Design and Children. In *Proceedings of the 6th international conference on Interaction design and children,* (pp. 73-76).

Bell, S. K., & Morgan, S. B. (2000). Children's attitudes and behavioral intentions toward a peer presented as obese: Does a medical explanation for the obesity make a difference? *Journal of Pediatric Psychology*, *25*, 137–148. doi:10.1093/jpepsy/25.3.137

Bellini & Akullian, J. (2007). A meta-analysis of video modeling and video self-modeling interventions For children and adolescents with ASD. *Exceptional Children*, *73*, 261–228.

Blaxill, M. F., Redwood, L., & Bernard, S. (2004). Thimerosal and autism? A plausible hypothesis that should not be dismissed. *Medical Hypotheses*, *62*, 788–794. doi:10.1016/j.mehy.2003.11.033

Blumberg, F., & Ismailer, S. (2008). *Children's Problem Solving During Video Game Play. Fordham University, Aug. 17*. Boston Convention and Exhibition Center.

Bouma, R., & Schweitzer, R. (1990). The impact of chronic childhood illness on family stress: a comparison between autism and cystic fibrosis. *Journal of Clinical Psychology*, *46*(6), 722–730. doi:10.1002/1097-4679(199011)46:6<722::AID-JCLP2270460605>3.0.CO;2-6

Burton, S.L. & Parks, APersonal author, compiler, or editor name(s); click on any author to run a new search on that name.L. (1994). Self-Esteem, Locus of Control, and Career Aspirations of College-Age Siblings of Individuals with Disabilities. *Social Work Research*, *18*(3), 178–185.

Cable News Network (CNN) Report. (2007).

Campbell, J. M., Ferguson, J. E., Herzinger, C. V., Jackson, J. N., & Marino, C. A. (2004). Combined descriptive and explanatory information improve peers' perceptions of autism. *Research in Developmental Disabilities*, *25*, 321–329. doi:10.1016/j.ridd.2004.01.005

Chambres, P., Auxiette, C., Vansingle, C., & Gil, S. (2008). Adult attitudes toward behaviors of a six-year old boy with autism. *Journal of Autism and Developmental Disorders*, *38*(7), 1320–1327. doi:10.1007/s10803-007-0519-5

Charlop-Christy, M. H., & Daneshvar, S. (2003). Using video modeling to teach perspective taking to children with autism. *Journal of Positive Behavior Interventions*, *5*(1), 12–21. doi:10.1177/10983007030050010101

D'Ateno, P., Mangiapanello, K., & Taylor, B. A. (2003). Using video modeling to teach complex play sequences to a preschooler with autism. *Journal of Positive Behavior Interventions*, *5*(1), 5–11. doi:10.1177/10983007030050010801

Dautenhahn, K., & Billard, A. (2002) Games Children with Autism Can Play With Robota, a Humanoid Robotic Doll. Proc. 1st Cambridge Workshop on Universal Access and Assistive Technology (CWUAAT). In S. Keates, P.J. Clarkson, P.M. Langdon & P. Robinson (eds.), *Universal Access and Assistive Technology*. London: Springer-Verlag.

Davidson, R. J., Ekman, P., Saron, C., Senulius, J., & Friesen, W. V. (1990). Approach-withdrawal and cerebral asymmetry: Emotional expression and brain physiology I. *Journal of Personality and Social Psychology*, *58*, 330–341. doi:10.1037/0022-3514.58.2.330

Dickson, K. L., Walker, H., & Fogel, A. (1997). The relationship between smile type and play type during parent–infant play. *Developmental Psychology*, *33*, 925–933. doi:10.1037/0012-1649.33.6.925

Dimberg, U. (1982). Facial reactions to facial expressions. *Psychophysiology*, *19*, 643–647. doi:10.1111/j.1469-8986.1982.tb02516.x

DiSalvo, C. A., & Oswald, D. P. (2002). Peer-mediated interventions to increase the social interaction of children with autism: Consideration of peer expectancies. *Focus on Autism and Other Developmental Disabilities*, *17*(4), 198–207. doi:10.1177/10883576020170040201

Duchenne, G. B. (1990). *The mechanism of human facial expression or an electro-physiological analysis of the expression of emotions* (Cutherbertson, R. A. (Trans. Ed.)). New York: Cambridge University Press. (Original work published 1862)

Duclos, S. E., & Laird, J. D. (2001). The deliberate control of emotional experience through control of expressions. *Cognition and Emotion*, *15*, 27–56. doi:10.1080/0269993004200088

Ekman, P., & Friesen, W. V. (1982). Felt, false, and miserable smiles. *Journal of Nonverbal Behavior*, *6*, 238–252. doi:10.1007/BF00987191

Ekman, P., Levenson, R. W., & Friesen, W. V. (1983). Autonomivic nervous system activity distinguishes among emotions. *Science*, *221*, 1208–1210. doi:10.1126/science.6612338

Fernández-Dols, J. M., & Ruiz-Belda, M. A. (1995). Are smiles a sign of happiness? Gold medal winners at the Olympic Games. *Journal of Personality and Social Psychology*, *69*, 1113–1119. doi:10.1037/0022-3514.69.6.1113

Frea, W. D. (1995). Social-communicative skills in high-functioning children with autism. In Krogel, R. L., & Koegel, L. K. (Eds.), *Teaching children with autism: Strategies for initiating positive interactions and improving learning opportunities* (pp. 53–66). Baltimore: Brookes.

Friedrich, S., Morgan, S. B., & Devine, C. (1996). Children's attitudes and behavioral intentions toward a peer with Tourette's syndrome. *Journal of Pediatric Psychology*, *21*, 307–319. doi:10.1093/jpepsy/21.3.307

Givens, S., & Monahan, J. (2005). Priming Mammies, Jezebels, and Other Controlling Images: An Examination of the Influence of Mediated Stereotypes on Perceptions of an African American Woman. *Media Psychology*, *7*(1), 87–106. doi:10.1207/S1532785XMEP0701_5

Goldstein, H., Kaczmarek, L., & Pennington, R. (1992). Peer-mediated intervention: Attending to, commenting on, and acknowledging the behavior of preschoolers with autism. *Journal of Applied Behavior Analysis*, *25*(2), 289–305. doi:10.1901/jaba.1992.25-289

Gray, C. A., & Garand, J. D. (1993). Social stories: Improving responses of students with autism with accurate social information. *Focus on Autistic Behavior*, *8*(1), 1–10.

Gray, D. E. (1993). Perceptions of stigma: The parents of autistic children. *Sociology of Health & Illness*, *15*, 103–120. doi:10.1111/1467-9566.ep11343802

Guite, J., Lobato, D., Kao, B., & Plante, W. (2004). Discordance Between Sibling and Parent Reports of the Impact of Chronic Illness and Disability on Siblings. *Children's Health Care*, *33*(1), 77–92. doi:10.1207/s15326888chc3301_5

Guralnick, M. J., Connor, R. T., Hammond, M. A., Gottman, J. M., & Kinnish, K. (1996). The peer relations of preschool children with communications disorders. *Child Development*, *67*(2), 471–489. doi:10.2307/1131827

Hagiwara, T., & Myles, B. S. (1999). A multimedia social story intervention: Teaching skills to children with autism. *Focus on Autism and Other Developmental Disabilities*, *14*(2), 82–95. doi:10.1177/108835769901400203

Hames, A. (2005). How younger siblings of children with learning disabilities understand the cognitive and social implications of learning disabilities. *European Journal of Special Needs Education*, *20*(1), 3–19. doi:10.1080/0885625042000319052

Heider, F. (1958). *The Psychology of Interpersonal relations*. New York: Wiley. doi:10.1037/10628-000

Hess, U., Kappas, A., McHugo, G. J., Lanzetta, J. T., & Kleck, R. E. (1992). The facilitative effect of facial expression on the self-generation of emotion. *International Journal of Psychophysiology*, *12*, 251–265. doi:10.1016/0167-8760(92)90064-I

Hollander, E., DelGiudice-Asch, G., & Simon, J. (1999). B lymphocyte D8/17 and repetitive behaviors in autism. *The American Journal of Psychiatry*, *156*, 317–320.

Holroyd, J., & MacArthur, D. (1976). Mental retardation and stress on the parents: a contrast between Down syndrome and childhood autism. *American Journal of Mental Deficiency*, *4*, 431–436.

Juvonen, J. (1991). Deviance, perceived responsibility and negative peer reactions. *Developmental Psychology*, *27*, 672–681. doi:10.1037/0012-1649.27.4.672

Juvonen, J. (1992). Negative peer reactions from the perspective of the reactor. *Journal of Educational Psychology*, *84*, 314–321. doi:10.1037/0022-0663.84.3.314

Juvonen, J., & Weiner, B. (1993). An attributional analysis of students' interactions: the social consequences of perceived responsibility. *Educational Psychology Review*, *5*(4), 325–345. doi:10.1007/BF01320222

Klin, A., Warren, J., Schultz, R., & Volkmar, F. (2002). Visual fixation patterns during viewing of naturalistic social situations as predictors of social competence in individuals with autism. *Archives of General Psychiatry*, *59*(9), 809–816. doi:10.1001/archpsyc.59.9.809

Konstam, V., Drainoni, M., Mitchell, G., Houser, R., Reddington, D., & Eaton, D. (1993). Career choices and values of siblings of individuals with developmental disabilities. *The School Counselor*, *40*(4).

Lorimer, P. A., Simpson, R. L., Myles, B. S., & Ganz, J. B. (2003). The use of social stories as a preventative behavioral intervention in a home setting with a child with autism. *Journal of Positive Behavior Interventions*, *4*(1), 53–60. doi:10.1177/109830070200400109

Nessa, N. (2004). National Statistics: The health of children and young people, (pp. 1- 20).

Newschaffer, C. J., Falb, M. D., & Gurney, J. G. (2005). National autism prevalence trends from United States special education data. *Pediatrics*, *115*(3), 277–282. doi:10.1542/peds.2004-1958

Odom, S. L., McConnell, S. R., & Chandler, L. K. (1993). Acceptability and feasibility of classroom-based social interaction interventions for young children. *Exceptional Children*, *60*, 226–236.

Oizumi, J. J. (1997). Assessing maternal functioning in families of children with autism. *Dissertation Abstracts International Section B: The Sciences and Engineering, 57* (7-B), 5720.

Pierce, K., & Schreibman, L. (1995). Increasing complex social behaviors in children with autism: Effects of peer-implemented pivotal response training. *Journal of Applied Behavior Analysis*, *28*, 285–295. doi:10.1901/jaba.1995.28-285

Rosenthal, R. (1963). On the social psychology of the psychological experiment: the experimenter's hypotheses as unintended experimental results. *American Scientist*, *51*, 268–283.

Schopler, E., & Mesibov, G. B. (Eds.). (1986). *Social behavior in autism*. New York: Plenum Press.

Scott, J., Clark, C., & Brady, M. (2000). *Students with autism: Characteristics and Instruction programming*. San Diego, CA: Singular.

Sehaba, K., Estraillier, P., & Lambert, D. (2005). Interactive Educational Games for Autistic Children with Agent -Based System. *Lecture Notes in Computer Science*, *3711*, 422–432. doi:10.1007/11558651_41

Shah, A., & Frith, U. (2006). An islet of ability in autistic children: a research note. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *24*(4), 613–620. doi:10.1111/j.1469-7610.1983.tb00137.x

Silton, N. (2009). *Fostering knowledge, positive intentions and attitudes of typical children towards children with autism.* Unpublished doctoral dissertation, Fordham University, USA.

Siperstein, G. N., & Bak, J. (1980). Improving children's attitudes toward blind peers. *Journal of Visual Impairment & Blindness*, 132–135.

Sturmey, P. (2003). Video technology and persons with autism and other developmental disabilities. *Journal of Positive Behavior Interventions*, *5*(1), 3–4. doi:10.1177/10983007030050010401

Swaim, K. F., & Morgan, S. B. (2001). Children's attitudes and behavioral intentions toward a peer with autistic behaviors: Does a brief educational intervention have an effect? *Journal of Autism and Developmental Disorders*, *31*(2), 195–207. doi:10.1023/A:1010703316365

Verte, S., Roeyers, A., & Buysse, A. (2003). Behavioral problems, social competence, and self-concept in siblings of children with autism. *Child: Care, Health and Development*, *29*(3), 193–205. doi:10.1046/j.1365-2214.2003.00331.x

Volkmar, F., & Pauls, D. (2003). Autism. *Lancet*, *362*(9390), 1133–1141. doi:10.1016/S0140-6736(03)14471-6

Ward, L., Hansbrough, E., & Walker, E. (2005). Contributions of Music Video Exposure to Black Adolescents' Gender and Sexual Schemas. *Journal of Adolescent Research*, *20*(2), 143–166. doi:10.1177/0743558404271135

Wert, B. Y., & Neisworth, J. T. (2003). Effects of video self-modeling in spontaneous requesting in children with autism. *Journal of Positive Behavior Interventions*, *5*(1), 30–34. doi:10.1177/10983007030050010501

Zihni, F., & Zihni, F. (1995). *The AZ method: The use of video techniques to develop language skills in autistic children*.

ADDITIONAL READING

Elder, J. (2006). *Different like me: My book of autism heroes*. London: Jessica Kingsley Publishers.

Farber, B. (1963). Interaction with Retarded Siblings and Life Goals of Children. *Marriage and Family Living*, *25*(1), 96–98. doi:10.2307/349015

Garrison-Harrell, L., Kamps, D., & Kravits, T. (1997). The effects of peer networks On social-communicative behaviors for students with autism. *Focus on Autism and Other Developmental Disabilities*, *12*(4), 241–256. doi:10.1177/108835769701200406

Gonzalez-Lopez, A., & Kamps, D. M. (1997). Social skills training to increase social interactions between children with autism and their typical peers. *Focus on Autism and Other Developmental Disabilities*, *12*, 2–14. doi:10.1177/108835769701200101

Gotthelf, C., & Peel, T. (1990). The Children's Television Workshop goes to school. *Educational Technology Research and Development*, *38*(4), 25–33. doi:10.1007/BF02314642

Gottlieb, J., & Gottlieb, B. W. (1977). Stereotypic attitudes and behavioral intentions toward handicapped children. *American Journal of Mental Deficiency*, *82*, 65–71.

Gould, L.J., & Corey, M. Social desirability in children: an extension and replication. *Journal of Consulting and Clinical Psychology,* 33-128.

Grandin, T. (1995). *Thinking in Pictures: My Life with Autism*. New York: Doubleday.

Grandin, T., & Johnson, C. (2005). *Animals in translation*. New York: Scribner.

Grossman, F. K. (1972). *Brothers and sisters of retarded children: An exploratory study*. Syracuse, NY: Syracuse University Press.

Gutner, T. (2004). Special needs, crushing costs. *Business Week, Issue 3885*.Klein, E.B., Haddon, M. (2003). The Curious Incident of the Dog in the Night-time. United Kingdom: Jonathan Cape.

Haring, T. G., & Breen, C. G. (1992). A peer-mediated social network intervention to enhance the social network intervention to enhance the social integration of persons with moderate and severe disabilities. *Journal of Applied Behavior Analysis*, *25*, 319–333. doi:10.1901/jaba.1992.25-319

Harper, D. C. (1999). Social psychology of differences: Stigma, spread, and stereotypes in Childhood. *Rehabilitation Psychology*, *44*, 131–144. doi:10.1037/0090-5550.44.2.131

Harris, M. J., Milich, R. C., Corbitt, E. M., Hoover, D. W., & Brady, M. (1992). Self-fulfilling effects of stigmatizing information on children's social interactions. *Journal of Personality and Social Psychology*, *63*, 41–50. doi:10.1037/0022-3514.63.1.41

Hayden-Thomson, L., Rubin, K. H., & Hymel, S. (1987). Sex preferences in sociometric choices. *Developmental Psychology*, *23*, 558–562. doi:10.1037/0012-1649.23.4.558

Hick, J. (1977). *Evil and the God of Love*. San Francisco: Harper and Row.

Iavaraone, A., Patruno, M., Galeone, F., Chieffi, S., & Carlomagno, S. (2007). Brief report: error pattern in an autistic savant calendar calculator. *Journal of Autism and Developmental Disorders*, *37*, 775–779. doi:10.1007/s10803-006-0190-2

Jones, E. E. (1990). *Interpersonal Perception*. New York: W.H. Freeman.

Kamps, D., Gonzalez-Lopez, A., Potucek, J., Kravits, T., Kemmerer, K., & Garrison-Harrell, L. (1998). What do the peers think? Social validity of integrated programs. *Education & Treatment of Children*, *21*, 107–134.

Kamps, D. M., Kravitz, T., Gonzalez-Lopez, A., Kemmerer, K., Potucek, J., & Harrell, L. G. (1988). What do peers think? Social validity of peer-mediated programs. *Education & Treatment of Children*, *21*, 107–134.

Kelley, H. H. (1967). Attribution Theory in Social Psychology. In D. Levine (Ed.), *Nebraska Symposium on Motivation, 1967*. Lincoln: University of Nebraska Press.

Maccoby, E. E., & Jacklin, C. N. (1987). Gender segregation in childhood. In Reese, E. H. (Ed.), *Advances in child development and behavior* (*Vol. 20*, pp. 239–287). New York: Academic Press.

Maras, P., & Brown, R. Effects of different forms of school contact on children's attitudes toward disabled and non-disabled peers. *The British Journal of Educational Psychology*, *70*(3), 337–351. doi:10.1348/000709900158164

McEvoy, M. A., & Odom, S. L. (1987). Social interaction training for preschool children with behavioral disorders. *Behavioral Disorders*, *12*, 242–251.

Morgan, S. B., Biebrich, A. A., Walker, M., & Schwerdtfeger, H. (1998). Children's willingness to share activities with a physically handicapped peer: Am I more willing than my classmates? *Journal of Pediatric Psychology*, *23*(6), 1998. doi:10.1093/jpepsy/23.6.367

Morgan, S. B., & Wisely, D. W. (1996). Children's attitudes and behavioral intentions toward a peer presented as physically handicapped: A more positive view. *Journal of Developmental and Physical Disabilities*, *8*, 29–42. doi:10.1007/BF02578438

Mottron, L., Dawson, M., Soulieres, I., Hubert, B., & Burack, J. (2006). Enhanced perceptual functioning in autism: an update, and eight principles of autistic perception. *Journal of Autism and Developmental Disorders*, *36*(1), 27–43. doi:10.1007/s10803-005-0040-7

Myles, B. S., Simpson, R. L., Ormsbee, C. K., & Erikson, C. (1993). Integrating preschool children with autism with their normally developing peers: Research findings and best practice recommendations. *Focus on Autistic Behavior*, *8*, 1–18.

Nabors, L. A., & Larson, E. R. (2002). The effects of brief interventions on children's playmate preferences for a child sitting in a wheelchair. *Journal of Developmental and Physical Disabilities*, *14*, 403–413. doi:10.1023/A:1020339004125

Newacheck, P. W., Inkelas, M., & Kim, S. (2004). Health services use and health care Expenditures for children with disabilities. *Pediatrics*, *114*, 79–85. doi:10.1542/peds.114.1.79

Notbohm, E. (2005). *Ten Things Every Child with Autism Wishes You Knew*. Arlington, Texas: Future Horizons.

Owen-Deschryver, J. S. (2004). Promoting social interactions between students with Autism and their peers in inclusive school settings. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 64(9-A),* 3246.

Rice, M. L., Huston, A. C., Truglio, R., & Wright, J. (1990). Words from "Sesame Street": learning vocabulary while viewing. *Developmental Psychology*, *26*(3), 421–428. doi:10.1037/0012-1649.26.3.421

Roeyers, H. (1996). The influence of nonhandicapped peers on the social interactions of children with a pervasive developmental disorder. *Journal of Autism and Developmental Disorders*, *26*, 303–320. doi:10.1007/BF02172476

Rogers, S. J. (2000). Interventions that facilitate socialization in children with autism. *Journal of Autism and Developmental Disorders*, *30*, 399–409. doi:10.1023/A:1005543321840

Rosenbaum, P. L., Armstrong, R. W., & King, S. M. (1988). Determinants of children's attitudes toward disability: A review of the evidence. *Children's Health Care*, *17*, 1–8. doi:10.1207/s15326888chc1701_5

Rosenthal, R. (1963). On the social psychology of the psychological experiment: The experimenter's hypotheses as unintended experimental results. *American Scientist*, *51*, 268–283.

Rosenthal, R. (1989). Experimenter expectancy covert communication and meta-analytic methods. Address delivered to the 97th annual convention of the American Psychological Association, New Orleans.

Rossi, P. H., Lipsey, M. W., & Freeman, H. E. (2004). *Evaluation: A Systematic Approach* (7th ed.). Thousand Oaks: Sage Publications.

Ruble, L. A., Heflinger, C. A., Renfrew, J. W., & Saunders, R. C. (2005). Access and service use by children with autism spectrum disorders in medicaid managed care. *Journal of Autism and Developmental Disorders*, *35*, 3–13. doi:10.1007/s10803-004-1026-6

Ryan, K. M. (1981). Developmental differences in reactions to the physically disabled. *Human Development*, *24*, 240–256. doi:10.1159/000272685

Schreibman, L., O'Neill, R. E., & Koegel, R. L. (1983). Behavioral training for siblings of autistic children. *Journal of Applied Behavior Analysis*, *16*, 129–138. doi:10.1901/jaba.1983.16-129

Serbin, L. A., & Sprafkin, C. (1986). The salience of gender and the process of sex-typing In three-to-seven year-old children. *Child Development*, *57*, 1188–1199. doi:10.2307/1130442

Sigelman, C. K. (1991). The effect of causal information on peer perceptions of children with a pervasive developmental disorder. *Journal of Applied Developmental Psychology*, *12*, 237–253. doi:10.1016/0193-3973(91)90014-U

Siperstein, G. N., & Bak, J. (1977). *Instruments to measure children's attitudes toward the handicapped: Adjective Checklist and Activity Preference List.* Unpublished Manuscript, University of Massachusetts, Boston.

Siperstein, G. N., & Chatillion, A. C. (1982). Importance of perceived similarity in Improving children's attitudes toward mentally retarded peers. *American Journal of Mental Deficiency*, *86*(5), 453–458.

Stephens, C. E. (2005). Overcoming challenges and identifying a consensus about autism intervention programming. *International Journal of Special Education*, *20*(1), 35–49.

TheHarvard Brain. (Spring 2000) An interview with Temple Grandin. *Vol. 7.*http://www.hcs.harvard.edu/~husn/BRAIN/vol7-spring2000/grandin.html.

Voeltz, I. M. (1980). Children's attitudes toward handicapped peers. *American Journal of Mental Deficiency*, *84*, 455–464.

Waltz, M. (1993). Chapter 9 of Pervasive Developmental Disorders: Finding a Diagnosis and Getting Help. O'Reilly & Associates. Retrieved October 2, 2007, from, http://oreilly.com/medical/autism/news/social_skills.html

Weiner, B. (1993). On sin versus sickness: A theory of perceived responsibility and social motivation. *The American Psychologist*, *48*, 957–965. doi:10.1037/0003-066X.48.9.957

Wisely, D. W., & Morgan, S. B. (1981). Children's ratings of peers presented as mentally Retarded and physically handicapped. *American Journal of Mental Deficiency*, *86*(3), 281–286.