Chapter 3

Social Stories in Robot-Assisted Therapy for Children With ASD

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ABSTRACT

Mobile technology devices are commonly used as assistive technology to support children with Autism Spectrum Disorder (ASD) in gaining skills in interpersonal communication. While considered generally safe and effective, there are concerns that a child that is taught to communicate through interactive technologies may become dependent on the virtual world and its rewards, while interpersonal skills are sacrificed or not generalized to real world settings (Bauminger-Zviely, Eden, Zancanaro, Weiss, & Gal, 2013). This chapter theorizes that the anthropomorphic embodiment of humanoid robots may provide a compromise between the real and the virtual worlds. The authors suggest that a humanoid robot can use social stories within an Applied Behavioral Analysis (ABA) framework to support the acquisition of social interaction skills of children with ASD. The objective of this chapter is to contribute to the current literature by providing a description of this intervention and make suggestions for its implementation using a case study approach.

INTRODUCTION

Children with autism spectrum disorder (ASD) tend to prefer non-social stimuli to social stimuli (Heflin & Alaimo, 2007). For over a decade, mainstream technologies (e.g., computers and tablets) have been used as assistive devices to facilitate interpersonal communication for this population (Bauminger-Zviely et al., 2013; Chen, 2012; DiGennaro Reed, Hyman & Hirst, 2011; Gay, Leijdekkers, Ageanas, Wong, & Wu, 2013; Grynszpan, Weiss, Perez-Diaz & Gal, 2014; Irish, 2013; Lee et al., 2013); including apps,
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computer games and virtual reality devices aimed to improve social engagement (Bauminger-Zviely et al., 2013) and emotion recognition (Beaumont & Sofronoff, 2008; Golan & Baron-Cohen, 2006), encourage positive interactions (Hourcade, Williams, Miller, Huebner & Liang, 2013), and enhance language development (Ploog, Scharf, Nelson & Brooks, 2013) and adaptive independence (Bian et al., 2013). These technologies offer safe, realistic-looking three-dimensional scenarios that can be built to depict everyday social scenarios, providing an environment that allows for self-paced learning and immediate feedback, while minimizing the need for ‘real world’ social interactions during the learning process (Golan & Baron-Cohen, 2006; Strnadová, Cumming & Draper Rodriguez, 2014), a common source of anxiety for many people with ASD.

Although these technologies appear to be effective, significant concerns include: (1) the child becoming dependent on the virtual world while interpersonal skills are sacrificed, and (2) significant restrictions in elements of face-to-face communication (eye gaze, body movement). The large gap between the safe and structured environment of computer-based interventions and real world social behavior results in poor transfer of skills to real world interactions (Bauminger-Zviely et al., 2013). Although virtual reality systems have the potential to provide higher degrees of control and interactivity between the user and the computer, the need to wear special technology that interferes with the individual’s natural behavior is an additional concern.

The aim of this chapter is to introduce a vision and plan of a new intervention approach aimed to contribute to the evidence base of using different forms of technology to enhance the social communication abilities of children with autism. This approach uses a humanoid robot and Social Stories™ (Gray, 2000) within the Applied Behavioral Analysis (ABA) approach to teach social communication skills.

LITERATURE REVIEW

Autism spectrum disorder (ASD) is a lifelong developmental disability that affects the way a person communicates and relates to other people. It is generally characterized by impairments in social communication, social interaction, and social imagination, along with patterns of repetitive behavior. The degree of the impairments related to ASD varies significantly across a spectrum, ranging from severe to near-typical social functioning. Relevant evidence-based practices and research-based therapies seek to improve the individual’s social and communication skills while, at the same time, promoting their engagement in interpersonal interactions. Although there is no cure for autism, early intervention programs are particularly beneficial and can lead to long-term gains in cognitive, social, emotional, and motor functioning (Bennett, 2012; Feil-Seifer & Matarić, 2008), providing considerable improvements to the individual’s quality of life and independence.

A recent trend in robotics is the design and implementation of machines (robots) that provide assistance to humans through social interaction, rather than physical intervention. This field is known as socially assistive robotics (Feil-Seifer & Matarić, 2005). The use of robots as mediators, or assistive tools during therapy for children with Autism is one of the first applications of socially assistive robotics (SAR). This section will present a comprehensive review of research in SAR as tools for intervention for people with ASD. An introduction to Applied Behavioral Analysis (ABA), Social Stories™ (Gray, 2000) and their potential for robot-assisted therapy is included.
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