

A Systematic Review for Assisting the Echolalia Attacked Autism People using Robot and Android Application

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ABSTRACT

The work presented in this paper was part of investigation in assisting echolalia attacked autism people with the help of mobile application. One of the biggest challenges that the society faces is ensuring that autistic children communicate and interact socially, so that they may develop their skills and consequently, contribute to the society. The objective of this study is to design a system that will help autistic children to improve their social interaction skills. The system will be run on the Android platform, a popular platform where a great number of smart phone device applications are run. The application will be designed based on the characteristics of echolalia attacked people with autism.

Keywords

Echolalia, social imagination, Robot and Android Application

1. INTRODUCTION

Identified by Leo Kanner in 1942, autism spectrum disorders (ASDs) are the fastest growing neurobiological conditions in the world. Autism is a life long developmental disability affecting how a person communicates with, and relates to, other people [1]. Autism is a lifelong developmental disability affecting how a person communicates with, and relates to, other people [2]. Autism Spectrum Disorder (ASD) is a neurological disorder that affects behavior and the ability to communicate and interact socially. It leads to feelings of fear, confusion, and loneliness [3]. Autism is one of five disorders that fall under the umbrella of Pervasive Development Disorders [4]. The three main areas of difficulty people with autism experience are:

1.1 Difficulty with Social Interaction

People with autism find it hard to recognise and understand other people's feelings and to manage their own, not understanding how to interact with other people can make it hard to form friendships.

1.2 Difficulty with Social Communication

People with autism struggle to use and understand verbal and non-verbal language, such as gestures, facial expressions and tone of voice.

1.3 Difficulty with Social Imagination

People with autism find it difficult to understand and predict other people's intentions and behaviour, and to imagine situations outside of their own routine [5].

People with autism may also experience over or under-sensitivity to sounds, touch, tastes, smells, light or colours.

Because of these impairments, children with autism have great difficulty in forming and maintaining social relationships. It is difficult for them to engage in social play, much less in collaborative play, and they will typically play by themselves with their own toys. Play is an essential activity during childhood. During play children can learn about themselves and their environments as well as develop cognitive, social and may lead to general impairment of children's cognitive development, learning potential and may result in isolation from the social environment [6-8].

Different approaches have tried to define the anatomical and functional correlates of emotional processing and theory of mind. Abnormalities have been consistently reported in individuals with autism. About 1 in 68 children has been identified with autism spectrum disorder (ASD) according to estimates from Autism and Developmental Disabilities Monitoring (ADDM) Network. ASD is almost 5 times more common among boys (1 in 42) than among girls (1 in 189). Research has shown that a diagnosis of autism at age 2 can be reliable, valid, and stable. On average, children identified with ASD were not diagnosed until after age 4, even though children can be diagnosed as early as age 2. When looking at age of first diagnosis by subtype, on average, those children were diagnosed with Autistic Disorder at age 4, Pervasive Developmental Disorder-Not Otherwise Specified at age 4 years and 2 months, and Asperger Disorder at age 6 years and 2 months [9].

To date, a number of advanced technologies have targeted the training of social competence of children with ASD [10] including video modeling [11] virtual reality [12] and socially assistive robots [13]. Recent studies have shown that individuals can learn to cope with common social situations if they are made to enact possible scenarios they may encounter in real life. Literature suggests that people with autism feel comfortable in predictable environments, and enjoy interacting with computers [14].

A few projects world-wide seek to include robots as part of the therapeutic regimen for individuals with autism. The great hope of this investigation is the development of a "social crutch," a robot that motivates and engages children, teaches them social skills incrementally, and assists in the transfer of this knowledge to interactions with humans. Since the behavior of a robot can be decomposed arbitrarily, turning off some behaviors while leaving others intact, we can selectively construct complex social abilities through layers of social responses [15-18].

On other hand, Yee [19] pointed out that mobile devices had gained popularity among the special needs community. Recent advancement in computer technology in mobile devices has opened up immense possibilities for children with ASD. Song and Yusof [20] pointed out that mobile devices serve as an augmentative and alternative communication (AAC) in the pocket and had since gained popularity because of its flexible multimedia content and storage, portability, mobility and affordability. The touch screen interface makes it appealing and simple to use as well. In this paper, Section III discusses literature survey made on this topic and in Section IV Tabulation shows the methods that are used to help children with ASD to improve their social interaction skills.

2. LITERATURE REVIEW

Dorothee Francois et al. 2009 presents a novel methodological approach of how to design, conduct and analyse robot-assisted play which is inspired by non-directive play therapy. This approach enables the experimenter to regulate the interaction under specific conditions in order to guide the child or ask her questions about reasoning or affect related to the robot. Children's progress was analyzed according to three dimensions namely play, reasoning and affect. The children who managed to play socially experienced progressively higher levels of play and developed progressively more reasoning related to the robot; they also tended to express some interest towards the robot, including on occasions interest involving positive affect [21].

Patrice L. (Tamar) Weiss et al. 2011 designed a suite to implement different patterns of collaboration to support teachers and therapists in their use of Cognitive-Behavioral Therapy. The use of collaborative patterns embedded in the structure of the Join-In suite appeared to be effective in leveraging the engaging power of computer games as well as capturing a level of ecological validity. A co-located suite of games (the Join-In suite) run on a multi-user tabletop surface supports social competence training for children with Autism Spectrum Disorder [22].

Leonardo Guisto et al. 2011 describe a co-located suite of games on a tabletop device to support social competence training for children with Autism Spectrum Disorder. This suite uses the patterns of collaboration to support therapists in their use of Cognitive-Behavioral Therapy. Improves social competence for children with high functioning autism

spectrum disorder (specifically their ability to interact and collaborate with others) [23].

Elizabeth S. Kim et al. 2013 examined the social behaviors of 4-12 year-old children with autism spectrum disorders during three triadic interactions with an adult confederate and an interaction partner, where the interaction partner may be a (1) another adult human, (2) a touch screen computer game and (3) a social dinosaur robot. Children spoke more in general, and directed more speech to the adult confederate, when the interaction partner was a robot, as compared to a human or computer game interaction partner. Children spoke as much to the robot as to the adult interaction partner. Social robots may be developed into useful tools for social skills and communication therapies, specifically by embedding social interaction into intrinsic reinforces and motivators [5].

R.M. Yogeswara et al. 2013 conducted behavioral studies on responses to emotional recognition and theory of mind aspects of social cognition. Studies were done before the intervention program and after the intervention program and compared responses with and without collaborative virtual environments. Collaborative Virtual Environment provides for users to explore social the situations and experience different behavior responses for a variety of simulated social interactions. Results suggest that the introduction of emotional expressiveness as part of virtual environment helped children with autism to communicate without fear and hence recognize others emotions [4].

Ben Robins and Kerstin Dautenhahn 2014 developed a new robot capabilities based on the tactile feedback provided by novel robotic skin, whose aim is to provide Cognitive mechanisms to improve human-robot interaction capabilities. Two novel tactile play scenarios were developed for robot-assisted play for children with autism. The play scenarios were developed against specific educational and therapeutic objectives. A set of tactile play scenarios, each with its relevant educational and therapeutic objectives in five key developmental areas [24].

3. TABULATION

The methods that are used to help people with autism. Spectrum disorder to improve social interaction skills are discussed below:

Table 1: Comparative Analysis

AUTHOR(S)	ADVANTAGE	DISADVANTAGE	TECHNIQUES USED
Dorothee Francois, Stuart Powell and Kerstin Dautenhahn [21]	This method has adapted to the child's specific needs and abilities through a unique trajectory of progression with respect to the three dimensions, Play-Reasoning-Effect.	The experimenter, a human-robot interaction researcher, was not behaving exactly like a therapist. The experimenter was not applying strictly the eight principles set out by axline.	Non-directive play therapy
Patrice L. (Tamar) Weiss, Eynat Gal, Sigal Eden, Massimo Zancanaro and Francesco Telch [22]	Implements different patterns of collaboration to support teachers and therapists in their use of Cognitive-Behavioral Therapy.	Even though it provides a good preliminary evidence for teaching social skills to children with ASD but its use via technology has not yet been explored.	Join-In Suite , touch-based application

Leonardo Giusti, Massimo Zancanro, Eynat Gal and Patrice L.(Tamar) Weiss [23]	Improves social competence for children with high functioning autism spectrum disorder (specifically their ability to interact and collaborate with others).	The learning part of a Cognitive Behavioural Therapy (CBT) session is felt to be not interested by children and tends to consist of conversations directed by the therapist.	Cognitive behavioural therapy based on three assumptions: (1) interpersonal cognitive processes and emotions (2) social problem solving and recognition of emotions (3) understanding of emotions
Elizabeth S. Kim , Lauren D. Berkovits, Emily P. Bernier , Dan Leyzberg , Frederick Shic ,Rhea Paul and Brian Scassellat [5]	It suggest that social robots may be developed into useful tools for social skills and communication therapies, specifically by embedding social interaction into intrinsic reinforcers and motivators.	It examines only the Quantity and not the semantic content or communicative function, of utterances under different conditions.	Comparison of the effects: interactions with a social dinosaur robot against a human or an asocial novel technology
R.M. Yogeswara, Siva Kumar, J. Santosh and S. Anand [4]	Collaborative Virtual Environments (CVE) provides the potential for users to explore social situations and experience different behaviour responses for a variety of simulated social interactions.	The emotions experiments are conducted only for limited emotions.	(1) Emotion recognition (2) Theory of mind
Ben Robins and Kerstin Dautenhahn [24]	A set of tactile play scenarios, each with its relevant educational and therapeutic objectives in five key developmental areas (i.e. sensory development, communication and interaction, cognitive development, motor development and social and emotional development) has been presented.	Tactile engagements in early encounters is found to be more difficult to understand by the children with autism.	(1) Non-formal therapy and learning (2) Integration of symbolic activity with motor manipulation (3) Action and reinforcement cycle

4. CONCLUSION

The objective of this paper is to solve the disability for autism people with echolalia attacked to socially interact. The world of autism is still a mystery to the sciences. While medical therapies are being devised with medicine and physical exercises, the necessity for ensuring equal opportunity for the autistic children in every sphere of life should be approached by technology. The mobile application is a big step toward developing an equal environment for autistic children. Consequently, this application seeks to lead toward devising more technological support for the autistic population that will help them acquire equal opportunities in every sphere of their lives.

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