



Can I sit here? A review of the literature supporting the use of single-user virtual environments to help adolescents with autism learn appropriate social communication skills

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ABSTRACT

People with autism frequently have difficulty in behaving in a socially acceptable manner, for example, they may stand too close to other people in a social situation or do not observe accepted social niceties. This can lead to peer rejection and a sense of isolation. Research has been carried out to investigate whether single-user virtual environments (SVEs) could provide a suitable intervention to help those with autism learn how to communicate with others in a socially acceptable manner. This paper reviews the research studies to date and considers whether SVEs could provide a viable intervention to teach social communication skills to autistic people.

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1. Introduction

In these days of social media we can make new ‘friends’, keep in touch with old friends, and socialise with acquaintances at the click of a mouse. We can tweet and we can twitter. We can blog and we can vlog. We can ‘like’ and ‘be liked’ on Facebook. (For an explanation of these terms see [Constant Contact, 2012](#)). With so much technology interfacing between us and other people it is almost easy to forget the face-to-face contact that is our conventional mode of socialising. Whilst many of our normal daily activities can now be carried out without that personal contact, such as the growing numbers of people who home-work or shop on-line, there are still many goods and services that we access face-to-face, including quite ordinary activities such as ordering food and drink in a café or bar. In these situations, we need to be able to make our needs known to the server or bar-tender, we need to find somewhere to sit down, and we may need to ask the whereabouts of the restroom. All this seems a normal, social process to communicate our needs and wants, and one which we probably take for granted. But what if you cannot instinctively perform these accepted social conventions? What if you are apt to say or do something inappropriate because you lack the same perspective as the typical person? What if going into a bar and asking for a drink and finding a table to sit at with your drink can present all sorts of social challenges to you? This is what can happen if you have autism.

2. Issue

In recent years the phenomenon of autism has increased in the numbers of those diagnosed with the condition, the theories behind the cause of the condition, and the interventions to help those diagnosed with it. Recent figures released by the Centers for Disease Control and Prevention indicate that there are currently 1:88 children diagnosed with autism in the United States ([Baio, 2012](#)). Within these figures, there is a gender imbalance in the numbers diagnosed. More males are currently diagnosed with the condition than females in a ratio of 5:1 ([Baio, 2012](#)). Such prevalence in the numbers of children diagnosed with autism have led some to describe it as an ‘epidemic’ ([Rimland, 2000](#)) while others consider the ‘rise’ in autism is due in part to better diagnostics and awareness of the condition and in part to anomalies in counting people with autism in the population ([Frith, 2003](#)). Whichever is the case, this rise in numbers has prompted a plethora of research into the causes of the condition and the interventions which could help autistic people in their daily lives.

According to the American Psychological Association (APA), the most widely accepted definition in the field whose 137,000 members make it the largest such organization in the world ([APA, 2012](#)), autism comes under the umbrella of a range of conditions termed Pervasive Developmental Disorders (PDDs). Within this, the APA describes five distinct categories of PDD: Autistic Disorder, Rett’s Disorder, Childhood Disintegrative Disorder, Asperger’s Disorder, and Pervasive Development Disorder Not Otherwise Specified ([American Psychological Association, 2000](#)).

Autism is not diagnosed medically but behaviorally ([Frith, 2003](#)). It has been described as a ‘triad’ of impairments, first

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mooted in a study by Wing and Gould (1979). They described difficulties centered around impairments in communication, impairments in social behavior, and repetitive behaviors (Wing & Gould, 1979). The behavioral diagnosis of autism, as defined by the American Psychiatric Association. (2000), focusses on these three behavioral issues. Individuals can differ widely in the manifestation of the condition. For example, some children have no verbal communication skills, some profound learning disabilities, and some experience difficulty with motor co-ordination (APA, 2000). This triad of impairments makes it very difficult to categorise and treat individuals with autism across the board. An oft repeated 'quote' that is difficult to attribute to one author is, 'If you know one person with autism then you know one person with autism.'

Some autistic people are also referred to as 'high functioning autistic' (HFA), although this is not an official diagnosis within the APA. In general, people referred to as having HFA are able to communicate verbally, to read and write, and they do not have a cognitive disability. That is, they could be said to have a normal intelligence compared to their peers (Autism Help, Undated). Individuals diagnosed with Asperger's Disorder (AD) have the ability to speak and the majority do not have a learning disability as is associated with autism (APA, 2000). However, people with AD share an impairment in social behavior with those with ASD (APA, 2000).

The inability to interact socially is one of the most difficult issues facing those with autism. The APA (2000, p. 80) describes those with AD as having "severe and sustained impairment in social interaction . . . typically manifest by an eccentric and one-sided social approach to others." Baron-Cohen, Leslie, and Frith (1985, p. 38) describe a "social ineptness." This inappropriate behavior can lead to peer rejection and a sense of isolation (Cobb et al., 2002). Learning social skills is not intuitive. Temple Grandin (2006, p.155), a prominent academic with HFA, tells us, "Autistic children have to learn social skills systematically, the same way they learn their school lessons." Frith (2003, p.221) further explains, "When applying the effortfully learned rules of ordinary polite conversation, we should not expect that conversation will then be as easy as for any other person who has long internalized the rules through internalized learning. Conversation may remain particularly stressful."

Medical and clinical opinion is divided on the causes of autism. Theory of Mind is one widely accepted theory. Pioneering work in this area was conducted by Baron-Cohen et al. as described in their 1985 paper. They theorised that the autistic child did not have the same sensitivity to other people's feelings, needs or wants as a non-autistic child. They considered that one of the results of this lack of empathy to others lead to the inability to socialise normally. In tests, they found that children with autism were unable to pass self-belief tests, that is, they did not show the ability to think what another person might think or believe (Baron-Cohen et al., 1985). Baron-Cohen et al. (1985) therefore concluded that autistic children did not have a Theory of Mind.

Another widely accepted theory is Central Coherence Theory. In her book, Frith (2003) likens weak Central Coherence Theory to the ability of someone to see the detail but miss the big picture whereas someone with a strong Central Coherence Theory may see the big picture but miss the detail. This weak Central Coherence Theory could explain the difficulties some autistic people having in understanding their whole environment (Frith, 2003).

Some theories are more controversial. For example, Kanner's 'Refrigerator Mother' Theory blamed the mother's lack of maternal instincts on the child's condition (Laidler, 2004). This theory has been roundly refuted although there are still some who ascribe to it (Laidler, 2004). The MMR (measles, mumps and rubella) Theory is another controversial theory, published in respected British medical journal *The Lancet*. The authors (Wakefield et al., 1998) claimed that the MMR vaccination caused autism. The article was

later retracted by the editors of *The Lancet* (The Editors of the Lancet, 2010) but not until much damage had been done to the MMR vaccination program in the United Kingdom (National Health Service, 2012).

Whilst clinicians and others debate the theory of autism, yet others are seeking to find suitable interventions to help autistic people. One area of research concerns interventions to help those with ASD to overcome their social impairments. Technology, in particular the use of computer software programs, is playing a large part in creating interventions which may help those with autism to learn how to behave in a more socially acceptable manner towards others. For example, much work has been done at the Massachusetts Institute of Technology under the iSet 'Interactive Social-Emotional Toolkit' program. This program aims to teach autistic people how to recognize and respond to others' emotions using a video recorder to record and label emotions (iSET, 2012). Similarly, Cheng, Moore, and McGrath (2002) set up a virtual reality program where emotions could be explored so that those with autism could consider, for example, how someone else might feel in a given situation, or how they might feel if they were not given something that they really wanted. A small number of researchers have used Microsoft's SenseCam head camera to investigate whether the wearing of such a device to enable the child to record their daily activities and subsequently replay them could provide a way to exchange and share views of their world with others as a means of socialization (Hayes et al., 2010; Marcu & Hayes, 2010).

Yet other teams of researchers are investigating whether children can learn the social skills that they need to fit into society by using a virtual computer environment in which to practise these necessary social skills. "iSocial" (2012), founded by researchers at the University of Missouri, uses virtual computer programs in which autistic adolescents can learn to develop their social skills through on-line collaborative interaction with each other. Much work on the potential use of virtual environments to support autistic youths has been carried out by researchers at the University of Nottingham, United Kingdom. Over a three year period, researchers developed the AS Interactive Project which aimed to develop software to create a virtual environment and assess whether this environment could help autistic people to practise and learn social skills (Leonard et al., 2002; Neale, Kerr, Cobb, & Leonard, 2002; Parsons et al., 2000; and others).

This review will consider whether using the medium of virtual environment software could teach autistic adolescents appropriate social behavior. To do this, it is first necessary to define the terms associated with virtual environments (VEs) and the differences between them. This paper focusses on whether the use of a single-user virtual environment (SVE) can help adolescents with ASD to learn how to behave in a socially acceptable manner. Cobb et al. (2002) describe SVE as an interactive space where a single user can individually learn about and practise social skills in a safe environment by communicating with virtual characters or avatars. This is distinct from a collaborative virtual environment (CVE) where a number of autistic users can communicate with one another in the virtual space (Cobb et al., 2002). The iSocial (2012) program, mentioned earlier, is one such collaborative space. A SVE is also distinct from an immersive virtual environment (IVE). An IVE involves the participant wearing headgear to provide a fully immersive 3D experience. Strickland (1996) was one of the first to research how autistic children may learn from an IVE experience. Some studies use the term 3D LE (three dimensional learning environment) or VLE (virtual learning environment) to describe a non-immersive VE. Other terms used are VER (virtual environment reality). This range of descriptors can be somewhat confusing. For the purposes of this review, the term VE will be used to describe virtual environments in general and SVE will be used to refer to virtual environments used by a single user.

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