

Advancing Lives  
through the Science of

# Virtual Reality

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FIGURE 1. Therapist and Participant Avatars in SecondLife

## Imagine walking into a room paralyzed with fear to talk with someone.

For Stacey, a young woman on the autism spectrum, that is a fear she faces every day. As a college student, Stacey attends her classes and returns home right after – never talking with anyone or making friends. She is too afraid to try and does not know what to say to start a conversation. For years, she has tried various social training groups, but still has never felt comfortable in social situations. Frustrated, anxious and alone, Stacey cannot make a connection with anyone.

The considerable fear and anxiety that those with autism experience in starting conversations is not the only core social cognition deficit. As John, a young man with autism, stated, “I wish I could

enjoy being in social situations with others. It’s so hard for me to interact in a group of people – I just don’t understand what they’re thinking.” Those on the autism spectrum also have difficulty understanding social relationships, creating a social and emotional stall as teens enter young-adulthood and are forced to attempt independent living. As a result of their social struggles, most young adults with autism want to belong, but feel isolated limiting their contributions to society. Also concerning is the economic burden to the individual and society, which is becoming an ever present reality. Those on the autism spectrum often need to rely on others for financial support and have difficulty finding meaningful and lasting employment (Hendricks & Wehman, 2009).

New evidence indicates that interpersonal skills such as learning how to read and convey emotions may be improved with explicit training in a motivating and visually stimulating way. Science has

shown that social brain networks can change given appropriate and meaningful intensive training. To capitalize on the brain's inherent plasticity, its ability to grow and change throughout our lifetime, researchers at the [Center for BrainHealth](#) in Dallas, TX have been on the forefront of research aimed at developing an intervention with experiential practice of real life scenarios utilizing a Virtual Reality (VR) environment designed to influence and facilitate social change in individuals.

Young adults like John and Stacey are using this VR tool and learning, for the first time, how to attempt social situations that they would otherwise turn away from. The VR social training, unlike a traditional therapy approach that uses one-on-one social training or social skills groups, allows participants to use a flexible VR training environment aimed at improving their daily social interactions. In the Center's recent research, Virtual Reality Social Cognition Training for Young Adults with High-Functioning Autism (Kandaloft et al., in press), therapists and participants utilize the online program SecondLife™ (Linden, 2003) to assume the role of an avatar and engage in social practice –(Figure 1) The study evaluated the VR platform on its ability to improve social skills, social cognition (the brain networks involved in social decision making) and daily functioning in autism.

The integral difference of the VR social training at the Center is that the training capitalizes on how the brain learns new information. The brain benefits best from short and intensive practices that are purposeful and meaningful. In the recent study, the entire training consists of 10 one-hour sessions over a 5-week period, a relatively short amount of time compared to traditional therapies. The young adults, aged 18-26 diagnosed with high-functioning autism, practice online conversations that target true-to-life social interactions such as starting a conversation, building friendships, interviewing for a job, negotiating, dealing with confrontation, and even dating. In each session,

participants, through the help of their own avatar, engage in non-scripted conversations with a confederate therapist to simulate a real-life situation (Figures 2,3,4).

The social training also maximizes the strengths of VR technology including its ability to immerse the participants in a practice that allows them to feel the same emotions they would in a real conversation. It also exposes the participants to everyday situations in a number of flexible environments by transforming daily living struggles into a safe and effective practice that can decrease anxiety and increase confidence. As Stacey explained after one of her training sessions, "At first, I was so overwhelmed because I didn't know what to say, but then I realized it's okay to mess up in practice. I could remember what I learned in the virtual world and it became easy to try to talk to people at school." With a big smile on her face she described how she now gets excited to meet her two new friends for a day of shopping – something that she never would have done before.

For John, he never considered the science behind starting a conversation. He just knew he didn't understand what people were thinking. Even though he had a part-time job at a retail store, he just kept to himself as a stocking clerk and tried not to interact with too many people, especially the customers. As a participant in the research study, John practiced interacting in real-world situations, like those at work, and attempted to "read" what someone else is thinking. After training, researchers could test if his understanding of others had really changed.

In fact, practicing in this flexible environment did result in an improvement of underlying social cognitive skills for John and other participants in the study. In other words, the brain's understanding of others in social situations was shown to improve after training in the VR environment. Social cognitive skills are essential to understanding what someone else is truly thinking or feeling. For



FIGURE 2. Coffee Shop Setting

instance, it affects the way the brain interprets what someone is intending when they make a sarcastic statement, “Yeah, I’m great” but shows an incongruent disgust on their face. Knowing what someone is thinking or feeling allows us to make social judgments about how we respond.

The researchers at the Center also investigated the change in real-life functioning after the VR training and found that social behaviors and conversational skills had improved. More importantly, follow-up results after treatment indicated the participants personally felt improved in how they interacted with others, which suggests the VR social training positively impacted their daily lives. Even John’s parents described the difference in their son after training. They noticed a distinct improvement in how John presented himself with self-assurance and made direct eye contact with others. The participant’s personal stories, like those from John and Stacey, described similar benefits from the VR training that gave them the assurance to meet new people and make new friends.

Shortly after the sessions, John was happy to report he had been given a promotion from a behind the scenes stocking clerk to an upfront sales position. He described how providing customer service

was something he now enjoys doing because he can anticipate what his customers want by their reactions. He stated, “I see for the first time what people are really saying just by picking up on cues I didn’t notice before.” Being able to learn through the VR social training how to interact with his customers gave him even further confidence to put his newly trained social adeptness to practice by pursuing a law degree.

The key to the success of the VR social training is that it makes use of the benefits of science and technology. The sessions target practice of meaningful events in a low stakes environment. It affords the ability to mess-up and begin again, given guidance from a therapist. The VR platform yields the capacity to seamlessly change social situations and conversational partners while building the social networks of the brain. The VR also maximizes treatment over a relatively short amount of time. As John stated, “four or five sessions of virtual training is worth about two or three years of real world training.”

Although there is need to further validate the effectiveness of VR social treatment, the early gains look quite promising to illustrate how technology can advance training the social networks of the



FIGURE 3. Apartment Setting



FIGURE 4. Office Building Setting

brain. The potential impact of this virtual training has both social and economic implications. This type of intensive and dynamic social training provides hope for social success to hundreds of individuals with autism who typically do not have access to treatment. It also provides low-cost intervention to these young adults and gives them practical skills needed to connect to others as they so long to do. Additionally, the economic burden of on-going costly treatment or job-training services could be reduced through fast and efficient virtual training.

Beyond the scope of autism, this type of virtual training method could be beneficial to a wide array of individuals looking to gain social expertise. From the executive looking to improve his social networking skills to the soldier returning home after deployment and looking to reengage into

civilian life, the combination of science and virtual technology training offers a new range of possibilities. For someone with autism, VR represents a door to their future, and for the first time they have to tools to approach with confidence instead of fear.

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