Frequency of stuttering during challenging and supportive virtual reality job interviews

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Abstract

This paper seeks to demonstrate the possibility of manipulating the frequency of stuttering using virtual reality environments (VREs). If stuttering manifests itself in VREs similarly to the way it manifests itself in real world interactions, then VREs can provide a controlled, safe, and confidential method for treatment practice and generalization. Though many researchers and clinicians recognize the need for generalization activities in the treatment of stuttering, achieving generalization in a clinical setting poses challenges to client confidentiality, safety, and the efficient use of a professionals' time. Virtual reality (VR) technology may allow professionals the opportunity to enhance and assess treatment generalization while protecting the safety and confidentiality of their clients. In this study, we developed a VR job interview environment which allowed experimental control over communication style and gender of interviewers. In this first trial, persons who stutter (PWS) experienced both challenging and supportive VR job interview conditions. The percentage of stuttered syllables was calculated for both interviews for each participant. Self-reported ratings of communication apprehension and confidence were also obtained, and were not significantly correlated with stuttering severity. Results indicated that interviewer communication style affected the amount of stuttering produced by participants, with more stuttering observed during challenging virtual interviews. Additionally, the amount of stuttering observed during the VR job interviews was significantly, positively correlated with the amount of stuttering observed during an interview with the investigator prior to VR exposure. Participants' subjective reports of the VR experience indicate reactions similar to those they report experiencing in the real world. Possible implications for the use of VR in the assessment and treatment of stuttering are discussed.

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Educational objectives: After reading this article, the reader will be able to—(1) list some of the challenges to treatment generalization; (2) describe how virtual reality technology can assist in alleviating some of these challenges; (3) describe how the frequency of stuttering varies across two different virtual environments.
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1. Introduction

This paper seeks to demonstrate the possibility of manipulating the frequency of stuttering using virtual reality environments (VREs). If stuttering manifests itself in VREs similarly to the way it manifests itself in real world interactions, then VREs can provide a controlled, safe, and confidential method for treatment practice and generalization.

Generalization of treatment effects is one of the major challenges facing clinicians who work with persons who stutter (PWS). Finn (2003) noted that the jump between clinical and real world situations is often large and foreboding to PWS. This perceived difficulty can form a significant barrier to treatment success. To facilitate treatment generalization, clinicians are advised to vary the places where techniques are practiced, the people the PWS interact with, and the tasks involved (Culatta & Goldberg, 1995; Finn, 2003; Manning, 2001). While scheduling repeated visits to venues outside of the treatment room is often desirable during treatment to improve generalization, controlling what occurs during these situations can be difficult or impossible for clinicians. Additional challenges include time away from the clinic, potential for loss of confidentiality for patients if the same locations are visited multiple times, and client safety.

Generalization is "the occurrence of relevant behavior under different non-training conditions (i.e., across participants, settings, people, behaviors, and/or time) without the scheduling of the same events in those conditions as had been scheduled in the training conditions" (Stokes & Baer, 1977, p. 350). In essence, treatments cannot be considered effective if the techniques taught fail to generalize beyond the clinic room (Bloodstein, 1995; Gregory, 1995; Ingham, 1984). Finn (2003) suggested that the development of [unspecified] "interim steps" in the therapeutic process enhanced transfer of new behaviors from the clinical to the real world, regardless of the treatment approach employed.

VREs are one possible interim step. Virtual reality (VR) is a human computer interaction in which users are active participants in a computer generated three-dimensional world (Schultheis, Himelstein, & Rizzo, 2002). VR differs from typical computer displays in that display and input technologies are integrated to create a sense of *presence* or *immersion* in the VR space. One approach uses a head-mounted display (HMD), which has earphones and a display screen for each eye, together with a motion tracking system. The user views and hears a computer-generated VRE in the HMD, and the integrated tracking system tells the computer how to change the display and sound to reflect the orientation of the user's head. In some VRE's, users can also hold joysticks that allow them to interact with or navigate through the environment. Careful combination of hardware and programming features create convincing VRE's that allow patients to have experiences that mimic those of the real world. Thus, VR may be useful in meeting some of the challenges encountered during the generalization phase of stuttering treatment (Brundage & Graap, 2004).

Maintaining client confidentiality during treatment generalization is often challenging. Clients are often reticent to practice techniques and/or advertise that they stutter to strangers. This is especially true early in the treatment process, because it is precisely these types of feared situations