A Virtual Reality Dialogue System for The Treatment of Social Phobia

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Abstract

People with social phobia have a severe fear of everyday social situations. In this paper we describe a virtual reality exposure therapy system specifically designed to expose patients with social phobia to various social situations. Patients can engage in a free speech dialogue with avatars while being monitored by a therapist. To control phobic stressors, therapists can control the avatar's gaze, the avatar's dialogue style and the narrative stories that are embedded throughout the exposure. The system uses the Delft remote virtual reality exposure therapy platform which allows remote treatment.

Keywords

Virtual reality exposure therapy; mental health computing; social phobia; DRVRET.

ACM Classification Keywords

H.5.1. [Information Interfaces and Presentation]: Multimedia Information Systems - Artificial, augmented and virtual realities.

Introduction

Social phobia is an anxiety disorder whereby people feel anxiety when exposed to everyday social situations or performance situations, such as talking to people, or

giving a presentation for an audience. They fear being embarrassed by their own actions and therefore try to avoid these situations all together. Further, individuals with social phobia report that their fear interferes with work or other daily activities. The disorder is one of the most often occurring mental disorders, with reports estimating this to affect, for example, 9.3% of the adult Dutch population in their lifetime [2]. The gold standard in the treatment of phobias is exposure in vivo, which means that patients are gradually exposed to situations they fear until anxiety reduces. Although effective, this therapy has a number of practical limitations, such as: (1) situations are often difficult to arrange and therefore costly, (2) therapists have limited control over the situation, and (3) patients are not always willing to undergo this therapy because of the dreaded situation they have to confront. To address these limitations, exposure in Virtual Reality (VR) provides a feasible alternative. Besides the fact that patients indicate a clear preference for VR over vivo exposure [3], a recent meta-analysis [5] on efficacy studies also indicated exposure in VR to be at least as effective as exposure in vivo. Previous research has so far rather focussed on other types of phobias such as panic disorder and agoraphobia, post-traumatic stress disorder, and specific phobia, i.e. fear of flying, acrophobia, and arachnophobia. However, preliminary research on the efficacy of VR therapy for social phobia is very promising [4, 6]. VR systems used for social phobia mainly focus on recreating a social setting, such as bar, shop, and dinner [4], or on the body posture of avatars, such as interested audience or less interested audience [7]. Less attention is actually given to the dialogue with the avatar. In most current systems, therapists often have only basic options for avatar's replies. They may either select from a limited set of

avatar's reply sentences, or they speak live through a microphone to create the avatar's voice. To allow patients to be exposed to free speech dialogues with different avatars, each with its own voice, the system, presented in this paper, uses the technique of semi-scripted dialogues. Using this technique in combination with monitoring the patient's anxiety, the presented system can also be used in a remote setting, where therapist and patient are located at different locations. These key elements will be discussed in this paper.

Social Scenes and Dialogues

To expose patients to various social situations, several dialogues were written for situations such as: buying a t-shirt, a bra or baby clothes in a shop; having a job interview; dining with a blind date; talking to a stranger at a bus stop; being interviewed by a journalist on a train platform; and giving a presentation to an audience, followed by a question and answer round. To personalize the scene the therapist can select a male or a female main character. The dialogues were written with Editor3 [9], which allows recording of several avatar responses as a reply on patient's comments at each specific place in the dialogue. During the session, the therapist controls what the avatar is saying by listening to patients' comments and selecting an appropriate avatar response. As a fall-back strategy each dialogue also has a number of dialogue independent avatar responses, which therapists can always select in case the patient's comment does not match one of the dialogue dependent avatar responses. To avoid an ever widening dialogue tree, as each avatar response can move the dialogue into a new directions, the dialogues were written in such a way that they merged back into the dialogue's main story line. The flexibility in the avatar's response allows patients to

have a different dialogue experience each time they are exposed to the same social situation.

Phobic Stressors

A key element in gradual exposure therapy is that patients are exposed to increasing levels of anxiety evoking stimuli. Traditionally this has been done by offering patients different social scenario's. Instead, this system also allows therapists to control three phobic stressors within a scenario, making the exposure more adaptable to a patient's anxiety level at a specific moment. The first phobic stressor is the narrative story, which are texts patients see before or during the dialogue. Just giving people different narrative stories, Bouchard et al [1] found that people reported different anxiety levels for the same virtual world. Default the texts give patients a neutral introduction into the social scene they are about to be exposed to, e.g. "Your blind date for the evening sits across the table…", or a text that links one scene to the other, e.g. "The waiter has brought you to the table…". However, therapists can also change these texts on the fly, making them less or more anxiety evoking for a specific patient. For instance, instead of referring to "a blind date" the therapist could change it to "a very critical blind date". The second phobic stressor is the dialogue style. This can be simply one dimensional, like a friendly to unfriendly style. With this therapists can change the avatar's replies from friendly to unfriendly in the middle of the dialogue. The system can also support multiple dimensions such as more or less self-revealing responses ("What type of music do you like"), performance responses ("Can you give me the name of the current cabinet ministers ?"), or cooperative responses ("I am sorry, but I'm not wearing a watch. I am afraid I cannot tell you the time" versus "No, I cannot give you the time"). By changing the slider therapists change the probability the system includes or excludes avatar responses labelled with a specific style from the database. With the third phobic stressor therapists can control the gaze of the avatar. The avatar's eyes can be fixed on the patient, or they can look at a patient only once in a while. Less or more direct eye gaze can have a different anxiety effect. For example, intense eye gaze could be very anxiety evoking, while not looking might also be anxiety evoking as patients might interpret this as the avatar has lost interest in them [8].

Patient Monitoring

Besides being able to control potential phobic stressors, the therapist also needs to monitor the patients' reaction, i.e. their anxiety level. The system supports therapists to record the subjective unit of discomfort, a measure whereby therapists ask a patient to rate his or her anxiety on a scale from 1 to 10. Furthermore, therapists can set pre-defined comment flags, e.g. patient is crying, or patient stops talking, on the scenario progression timeline. Besides the manual indicators, the system also provides physiological indicators of patients, i.e. their heartbeat rate and their galvanic skin response. As the therapist and patient might not be located in the same room, therapists see the patient on a camera, and they can listen and talk to the patient through an intercom.

Hardware set up

Although the entire system can run on a single computer, the standard setup is to run it on two computers: a therapist computer and a patient computer. Patient monitoring and controlling the virtual world, including the avatars dialogue, is done on the

therapist computer. The patient computer is responsible for collecting monitoring data and rendering the virtual world thereby following the instructions from the therapist computer. Rendering can be done by connecting a projector to the patient computer or a head mounted display.

Remote Platform

The system used the Delft remote virtual reality exposure therapy (DRVRET) platform. This platform supports remote treatment, using the internet to connect the therapist and the patient computer. To conform to local organizational network rules, the remote setup can also be established by having both computers at the patient's side, and making a remote desktop connection with the therapist computer. Of course in this case three computers are required.

Discussion

To examine the efficacy of the VR therapy for social phobia, a randomized controlled trail is being conducted at the moment comparing this treatment with exposure in vivo. Further plans are to develop a home-based version of the system allowing patients to use the system at home. Initial reports [8] on using speech recognition in this case seem promising.

Acknowledgements

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