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Virtual Reality Exposure Therapy of Social Phobia

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Abstract

This thesis presents researches and experiments performed in collaboration with a psychiatrist in order to validate and improve the use of virtual reality in social phobia psychotherapy.

Cognitive and behavioral therapies are strongly based on the exposure to fearful stimuli. By repetitively forcing patients to face an anxiety provoking situation, therapists mean to develop behavioral habituation and to correct cognitive deviance, leading to long term reduction or even suppression of the anxiety disorder. In this context, virtual reality appeared to be appropriate for exposure as it allows for the reproduction of real situations, everywhere and at anytime. The idea has been validated against various phobias such as acrophobia, fear of flying, or post traumatic stress disorders. A generalisation to social phobia would not have been possible without prior validation: if sense of presence in a virtual environment is well known in flight simulators, social presence is more complex. The difficulty in this case is to verify that we can reproduce social phobia anxiety provoking stimuli with virtual humans.

Therefore, and in order to provide therapists with an efficient virtual reality system dedicated to the exposure to social situations, we have developed software solutions supporting different immersion setups and enabling the realistic simulation of inhabited virtual environments. We have experimented with public speaking scenarios involving multiple virtual humans presenting typical assembly attitudes. Thanks to a preliminary study, three clinical case studies and a validation study on 200 subjects, we have been able to confirm that our virtual reality platform fulfilled therapeutic exposure requirements for social phobia.

Moreover, we have been able to show that virtual reality exposure has additional advantages such as the possibility to improve clinical assessment with embedded monitoring tools. Our experiments with a physiological measurement device allowed for the elaboration of a computerized model of affective states arousal. The integration of eye tracking technology into immersion enabled us to validate a system for objective and reliable assessment of a social phobics' safety behavior: the eye-to-eye avoidance. The observation of such phobic behaviors confirmed the simulation impact and can provide therapists with enhanced pathological progression monitoring.

During our experiments, we have also been able to observe that subjects' reactions during immersion were so much influenced by their sensitivity to fearful stimuli that their cognitive reactions were 'overloaded' by the arousal of anxiety and emotions. This allowed us to consider that the feeling of presence was more importantly related to the subjective phobic impact of the simulation than to the quality of the technological mediation in itself.