

# Designing and evaluating virtual environments for the treatment of claustrophobia

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**Abstract**—It is an unquestionable fact that the future is headed towards virtual reality (VR). It is widely used in many different fields like in education, in training, in video games, in heritage and in psychology. Many researchers claim that the best VR applications are focused in therapy rather than entertainment. The effective use of virtual reality applications for the treatment of psychological disorders like phobias and specifically claustrophobia, has been proven by a lot of studies through the years.

Virtual reality exposure therapy (VRET) can help people change the way they think, act and interpret information. It brings them face-to-face with their fears in a safe environment, where knowing that the situation is harmless, they can deal with them safely. It has many advantages over vivo exposure; it's more convenient and cost effective. For the fear of flight for example, it's impossible to make a patient fly over and over again with a real airplane until his/her fear reduces, whilst with VRET, you can repeat the process, as many times as it is needed. Another advantage is that the developed VR application can be completely controlled by the therapist and by the patient.

Claustrophobia is the phobia that we have studied. Creating the right virtual environments (VEs) for a patient to get immersed in, is crucial if we want to eventually treat them only with the use of VRET. We designed and developed a virtual reality application, and conducted an experiment to identify the characteristics that the VEs should have in order to make them most suitable for the treatment of claustrophobia.

It is important though, if we want this method of treatment to be as reliable and successful as possible, to fully understand the human behavior in claustrophobic environments. We need to identify what characteristics make the environments claustrophobic and what makes people anxious there. The reasons and ways the environment made the participants anxious were examined from their own reports combined with the observation of their behavior during the experiment.

Moreover, with the use of questionnaires, their anxiety and claustrophobia were measured, and the relationship between the amount of claustrophobia a person has and specific behaviors in the VEs was checked.

Lastly, it was investigated whether the gender of the person affects their anxiety. This way, we will be able to create the ideal claustrophobic environments in future VR applications for patients to be immersed in and to effectively treat their fear.

Our results have shown that a factor that contributes to the anxiety of a person in a VE is the messiness of the space. Moreover, the VE should definitely be a closed space, and its dominant color isn't a factor for anxiety alongside how present the patient feels in the VE.



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