

# Virtual environments for exposure in Obsessive-Compulsive Disorder

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**Abstract — Obsessive Compulsive Disorder (OCD) affects 2.6% of the population in Mexico, severely affecting the quality of life of the people who suffer it. The World Health Organization (WHO) ranks OCD as the tenth leading cause of disability in the world, representing a health issue that requires attention, especially from health professionals. Several studies on the different treatments developed for this disorder have been carried, including: exposure, response prevention and cognitive therapy. We developed a treatment based on virtual reality (VR) technologies to expose patients with OCD to controlled virtual environments. The treatment includes sessions of psychoeducation, breathing training, cognitive restructuring and exposure, using a Head Mounted Display (HMD). VR increases the sense of immersion and presence in the environment, and evokes the same reactions and emotions that are experienced in real situations.**

## 1. INTRODUCTION

People with OCD develop excessive fears of situations that are not truly dangerous. The obsessions involved can be a variety of thoughts, images or impulses and the compulsions can involve any number of repeated actions or thinking patterns. Among the many types of obsessions and compulsions, highlights: contamination obsessions (bodily waste or secretions, dirt or germs, environmental contaminants, insects, becoming ill from contamination), contamination compulsions (cleaning of the house, cleaning of objects, avoidance of objects considered “contaminated”), ordering obsessions (preoccupation with symmetry, exactness or order, concern with aligning papers, books) and ordering compulsions (counting items, books, arranging items in a certain order).

The use of this technology is based on the non direct exposure of the subjects to feared situations, which could result to be costly, inconvenient or inaccessible considering certain circumstances. Using virtual environments that simulate real situations we reduced the aversion of the patients. Most research has focused on anxiety disorders, but this have centred in the virtual reality treatment for eating disorders, addictions, psychological

assessment, pain management, palliative care, some impulse control disorders and rehabilitation (Clark et al, 1998, Kirkby et al, 2000).

For OCD there are few studies conducted based in information technologies (Krijn et al, 2004; North et al, 1998; Van den Hout, 2003). One example is the study of Clark (1998) in which behavioural experiments were conducted in virtual reality with a specific focus on the behaviour of compulsive washing. The results of this study were moderately satisfactory and the authors raised the possibility of seeing the behavioural experiments with virtual reality as an initial evaluation or previous training for the treatment and that this don't necessarily replaces traditional therapy based on in vivo exposure and response prevention.

## II. VIRTUAL EXPOSURE FOR OCD

Because the prevalence of OCD in Mexico, we proposed to develop a treatment protocol and virtual reality environments for two kinds of obsession and compulsions: Contamination Obsessions and Ordering obsessions. This type of intervention aims to reduce the anxiety and dislike that produces a treatment based on exposure and traditional response prevention. The treatment supported by virtual reality exposes the patients to their obsessive triggering fears in tridimensional computer environments.

## III. VIRTUAL ENVIRONMENTS

The bus is considered a scenario in which people must interact with the elements that compose it, such as people and elements inherent to this space. To bring some obsessive fears, this scenario often has aversive stimuli for OCD patients with contamination obsessions; such stimuli are associated with dirt on the seats, grab tubes from the floor, contact with dirty or untidy persons or apparently suffering from some illness, which patients perceive as an important source of infection.

The traditional restaurant represents an ideal scenario to work with obsessions of contamination because the persons with OCD can't be sure of the

conditions in which their food is prepared in relation to hygiene and handling by other persons or the provenance of the ingredients of the prepared dishes, concern of the neatness of other elements of the place (dishes, cutlery, trays, tables, chairs, telephones, floor) because of the regular use that many people do of this. Likewise contains elements that can help work with the obsessions of order, symmetry, incompleteness and accuracy that cause anxiety, distress or discomfort in the patients, such as sauces, salt shakers, mugs and napkins among others.



**Figure 1.** *Virtual restaurant for contamination obsessions.*

The room is composed of a bed (with sheets, blankets, quilts, rollers), a bookseller (with TV, books), a desktop (with office work items such as pens notebooks, sheets), comfortable with diverse Articles in (medicine, magazines, etc..) and a wardrobe (with clothes, shoes and other accessories inside). It is a space in which the patient may be exposed to various degrees of disorder of the aforementioned elements, as well as potential pollution stains, dust, besides being a place that refers to their daily lives.



**Figure 2.** *Virtual room for order obsessions.*

The public restroom represents one of the most feared by people with obsessions of contamination to be considered as a potential source of disease, by the constant use that people make of it, where dirt may be largely perceived in body fluids that are perceived as unpleasant, dirty and transistors of

various kinds of diseases. All elements of the site are intended to cause discomfort or anxiety in the patient by the possible pollution arising from this stimulus.



**Figure 3.** *Virtual environment of rest room.*

**Table 1.** *Patient and therapist Interaction.*

Environment	Patient	Therapist
Bus	Navigate	Cleaning level
Public restroom	Interact with objects Order some objects	
Restaurant		Order level cleaning level men and women selection trigger event related with the obsessions (conversations, animals, tv and radio news)
Room		

#### IV. METHOD

The study (still in process) establishes as goal the evaluation of usability and user's preferences of virtual reality environments for OCD. In this paper, we present results of a sample of 30 college students who voluntarily participated in the study, providing informed consent. The aim of the study was to expose participants to virtual environments for OCD treatment in a desktop computer with a head mounted display with integrated head-tracker Vuzyx ® VR920 and using a joystick for the navigation. Participants were exposed to the five scenarios developed to assess RV rates Presence and usability preferences of the participants. The assessment tools used report variables measured by indicators of anxiety such as galvanic skin response, temperature and heart rate frequencies as well as the self-report of Presence and Reality Judgement (Baños et al. 2006).

## V. CONCLUSIONS

The introduction of new technologies to psychological treatments has been successfully proven in several studies. However in the case of OCD, there are few researches using this technology. Virtual environments could provide clinical important advantages, such as reducing the patient anxiety and aversion, increase the control of the environment and gradually exposure to obsessive triggering fears to each patient. Data will provide us of an empirical base to adjust and disseminate the innovative treatment protocol.

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