

Transformative Experiences Become More Accessible Through Virtual Reality

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ABSTRACT

Virtual Reality (VR) has immersive powers that can teleport an immersant into a virtual world and provide them with an experience of being somewhere that they may not have been able to go to. These powers of VR are most often used for games and entertainment, creating a space for escapism and isolation that may have negative psychological and societal outcomes. In this paper, we argue for an opposing application of VR technology - for promoting wellness and feeling of connectedness with people and the world around us. Such feelings can be elicited as a result of a profound awe-inspiring experience, that expands one's mental model and consequently leads to a positive behavioral change. Such experiences are described as transformative, or in strong cases 'pivotal'. Unfortunately, these experiences are rare, only accessible by some people, and nearly unavailable for researchers interested in studying this phenomenon. The immersive powers of VR present a unique opportunity to reproduce such experiences in the lab or at home, thus making them accessible both to the public and to the researchers. Having real-time access to an experience of the immersant will allow the researchers to study the progression of the transformative experiences and understand its effects and precursors. In this paper, we are proposing a framework through which transformative experiences can be studied in VR. Understanding this phenomenon will inform how VR experiences should be designed in order to create a positive impact on our society.

Index Terms: Human-centered computing—Human Computer Interaction—Interaction Paradigms—Virtual Reality; Applied Computing—Life and Medical Sciences—Consumer Health Applied Computing—Education—Interactive Learning Environments

1 INTRODUCTION

A few fortunate individuals have an opportunity to have a profound experience in their lives that evolve them as a changed person. Such experiences are often described as transformative or, in strong cases, 'pivotal' or, when interpreted through spirituality, transcendent. While these experiences have a positive psychological effect, they tend to be very rare, and difficult to study [16]. These experiences most often occur when an individual observes the vast beauty of nature, for example when one climbs a mountain [25], reaches Antarctica [17] or looks at Earth from space [26]. As such, for most cases these experience are only accessible to the privileged group of people, who have the physical and financial means to travel to the places where a transformative experience can occur. We posit that Virtual Reality (VR) technology can increase the accessibility of such experiences for both researchers interested in understanding them and the larger population interested in experiencing them [7, 20, 21]

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2 CURRENT CHALLENGES

Currently transformative experiences are very difficult to study because they are rare, private and complex. As such, for the researchers interested in better understanding and researching these experiences, it is fairly difficult to find individuals who have gone through a transformative experience. Transformative experiences are very private, thus, even if a researcher happens to be next to the person who is having a transformative experience at that moment, any intrusion from the researcher will prevent the experience from happening. Therefore the only information available for the researchers is retrospective, with a long delay between the experience and the interview or survey, which makes this measure prone to recall and interpretation errors [12].

An individual experience of a person having a transformative experience will be different from an experience of another individual [25]. Not only will the individual variables have an effect on each personal experience, but the environment in which these experiences occur also differ, thus making it even more difficult to make generalizations from the collected interviews.

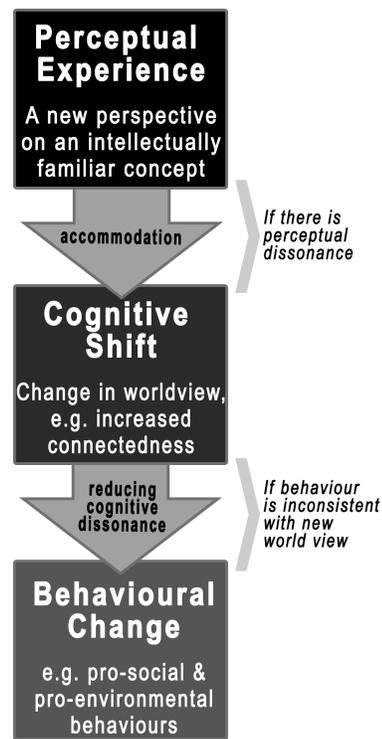


Figure 1: Tranformative Framework

3 THE FRAMEWORK

We are proposing a framework (see Fig. 1) that discusses transformative experiences as transitions between three stages: perceptual experience, cognitive shift and behavioral change. We are proposing how VR can be used in order to create a controlled environment to apply this framework to study transformative experiences.

3.1 Perceptual Experience (Stage 1)

We posit that a transformative experience starts from a novel perceptual experience that is able to elicit an emotional response. In many cases, this experience has the property of perceptual vastness which elicits emotions such as awe [14, 15]. VR technology can be used to create vast stimuli, and in combination with an affordance of inducing the sense of "presence" it has the potential to elicit awe-inspiring experiences [5]. As the environment is created in the VR it will remain more or less constant between each participant of the study, thus having this environmental variable controlled.

This stage can be studied in detail through physiological measures. Biosensors such as heart rate variability, galvanic response, and goosebumps [2, 11, 19] can help identify specific moments in the experience that resulted in an emotional response in the participant. Another evaluation method that should be paired with physiological measures is cued-recall debrief [3], where the participant re-immerses inside their experience while watching a recording of it. This measure is less prone to memory errors than interviews, and will allow the researcher to disambiguate events observed in the recordings of the physiological measures. Correlating all of these measures with the recording of participant's view will give the researchers access to the specific moment of change for the participant, and the relation to the components of the virtual system. This would provide the valuable information about the effectiveness of the specific elements of the design of the virtual environment in ability to trigger affective response.

3.2 Transformative Design Framework (Transition 1)

Andrea Gaggioli [7] proposed a framework that explains how the transition from the perceptual experience to the cognitive shift happens. When presented with a powerful and novel perceptual experience, an individual has three options of dealing with it: assimilation, accommodation or rejection. If an individual is able to fit the experience into their current worldview, then the experience will get assimilated and no further change will occur. However, if the experience does not fit with the worldview, thus there is a perceptual dissonance, then the worldview ought to change to accommodate for the new perspective, which would lead to a cognitive shift. However, if the individual is not able to accommodate the new perspective it will get rejected, by finding an alternative explanation for the experience, e.g. an illusion or a hallucination. While in the real world, this third option of rejection is less likely to occur; in the case of a VR experience, it is easy to disregard it as not real. Thus it is important for the researchers to pay attention to how they prepare the participant to the experience by carefully building trust in the system.

3.3 Cognitive shift (Stage 2)

After a successful accommodation, an individual will experience a cognitive shift in their worldview, or an expansion of their mental model. This stage is the most challenging to assess, as it requires the use of implicit measures that can tap into the structure of the cognitive system of the participant. Such measures can use physiological measures such as eye-tracking, or tests that rely on reaction time or disambiguation [28].

An example of such implicit measure is an Implicit Association Test (IAT) [10], that can, e.g., be used for assessing one's connectedness to nature [4, 23], which is one of the observed outcomes of transformative experiences [27]. This is a computerized test that

uses reaction time to assess how closely one associates "self" with "nature". A disambiguation test can use ambiguous images or stories to infer participant's attitudes from his interpretation of the stimuli. Tests that rely on reaction time have more noise than disambiguation tests, but they provide a continuous measure and they are more resilient to social desirability bias.

3.4 Theory of Cognitive Dissonance (Transition 2)

Similarly to the transformative design framework, cognitive dissonance theory [6] explains the transition from the cognitive to behavioral change through emergence of a disequilibrium and the desire of the cognitive system to return to equilibrium. Thus if the new worldview is inconsistent with current behavior of the participant, then to resolve the conflict either the worldview or the behavior will need to change. Since the worldview has just been adjusted in order to accommodate for the perceptual experience, at this stage adjusting the worldview will create a new conflict, so the only way to achieve the equilibrium would be to modify one's behavior to reflect new values of the expanded mental model.

3.5 Behavioral Change (Stage 3)

The ultimate goal of understanding how to design the transformative experiences is to create a caring society where an individual will find it unnatural to behave in a way that is destructive or ignorant. This stage can be evaluated through behavioral measures such as observing participants' pro-social [22] or pro-environmental [1] behaviors. These observations are performed with deception by staging a situation to which a participant has to react, e.g. experimenter can drop pens [22] or spill water [1], and then participants behavior is observed. This measure can also use reaction times.

However, it is important to consider the timeline at which this change occurs. While taking this measure right after the VR experience is convenient, it will be prompt to two possible issues: 1) it may not capture the change that requires longer processing time before the cognitive system achieves equilibrium, thus producing a false negative result in the measure; or on the other hand, 2) it may also produce a false positive result, by failing to assess longitudinal effects of the experience.

4 A CASE OF THE OVERVIEW EFFECT

For the specific example of how this framework can be applied, we want to discuss the Overview Effect. The Overview Effect is the profound experience that astronauts have when they see the Earth from space, and realize how beautiful and fragile the planet is, and how we all as living species need to unite together to protect our home planet [26]. This is a strong, profound experience with long-lasting positive psychological effects [13, 24]. A lot of astronauts after returning to Earth start engaging in pro-social and pro-environmental activities [9]. However, as space flight is inaccessible to the majority of the world population, this presents a perfect case for VR technology to step in and deliver an experience to the general public that could induce the Overview effect (or an extent of it) without shooting rockets into space. In order to evaluate whether the VR experience was able to achieve an extent of the Overview Effect, the researchers can look for the emotion of awe and wonder felt [8, 19], the cognitive shift leading to increased connectedness with nature [4, 23], and observe pro-social [22] and pro-environmental [1] behaviors.

We are iteratively working on a prototype of a VR experience inspired by the Overview Effect; the user tests are indicating that the VR experience is effective in eliciting desired emotional responses and has potential for inducing a cognitive shift [18]. However, the description of our prototype and the results of the tests are out of the scope of this position paper.

5 CONCLUSION

VR can provide a unique opportunity for researchers to study a very complex and personal phenomenon of transformative experiences in a controlled lab environment, making these profound positive experiences accessible for both the researchers and general public willing to improve their well-being. Such transformative VR installations can be made available to the public in culture spaces, such as museums and art galleries, thus not only providing access to these positive experiences to general public, but also giving researchers a potential access to a wide range of participants. In the future, when VR technology becomes even more widespread and the transformative experiences design is well understood, these VR experiences can be made available for the public to use at the comfort of their own home for improvement of their well-being akin to mobile meditation apps. However, the design of the experience and the research of it are interdependent, and thus we will need to design and evaluate the experience and the evaluation methods, proposed for assessing the progression through stages of the transformative experience, through an iterative process, at the end of which we will build the knowledge of how to design VR experiences for well-being and a positive change in society.

ACKNOWLEDGMENTS

The authors wish to thank NSERC and NGX Interactive. This work was supported in part by NSERC Engage grant.

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