Undergraduate article

Do awe-inspiring VR environments impact creativity?

Natasha Cloran | Institute of Art, Design + Technology.
Sean Henriques | Institute of Art, Design + Technology.
Conor Cronin | Institute of Art, Design + Technology.
Dr John Greaney | Institute of Art, Design + Technology.

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Abstract
This article aims to consolidate existing research on the intersection of virtual reality, awe and creativity, and to illustrate the type of undergraduate research that is feasible to conduct with a dedicated research lab and technical support. It is also hoped that readers may be inspired to seek awe in everyday experiences and in the natural wonders of the night sky.

In her final year applied psychology project, Natasha Cloran explored the impact of different virtual environments on people's thinking and emotion, with particular focus on experiences of awe and creativity. Virtual Reality (VR) allows for researchers to meticulously control and measure people's responses to different environments - such as immersive 3D versus flat 2D, or awe-inducing nature versus everyday settings. Can being placed in a virtually expansive scene lead to a parallel broadening of the mind in helpful ways? This paper is designed to outline the topic in an accessible format for a non-specialist audience.

1. Inspiration for the Research

A final year Applied Psychology student describes her interest in the emotion of awe that eventually led to her final year project:

> I once experienced awe on a beach in Thailand, watching a lightning storm out at sea. That experience where time stood still was among my favourite memories. [Some years later] I woke up on May 11th 2024, to my social media news feeds filled with pictures and videos of the Irish sky filled with the northern lights. It is unusual to see such activity with clear skies in this part of the world, but it is not unprecedented. Irish folklore and scientists have documented this as a terror experience over the centuries. However, understanding how it is created removes the fear and allows us to enjoy the aesthetically pleasing light show. As an experience high on my bucket list, I was disappointed to miss it so close to home. I joined some social media groups and researched space weather phenomena. I wanted to know when I could see this again.
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> On October 10th, 2024, it was one of those heavy days — burdened by difficult circumstances beyond my control — when a notification prompted me to check the sky. Through my phone's camera, I caught a glimpse of shimmering green and pink: the Northern Lights. After waiting so long to see them, I had expected excitement, but instead, I felt an overwhelming intense sense of calm, contentment, and wonder—an emotion I now recognize as awe, the 'wow' emotion. In that moment, my daily struggles faded, and the feeling lingered until the next day. I took some pictures and shared them with friends and family, and on some online parent support groups, my phone filled up with images of the Aurora around Ireland in reply. "I was having such a bad day. Thank you so much for sharing," and "This is amazing. I just keep staring out the window." It was magical and transformative, a shared experience that lifted everyone.
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> I was at the initial stages of my major research project undertaken for the IADT Applied Psychology degree and with the support of my supervisor Dr John Greaney, I pivoted to research the awe phenomenon. Sean Henriques had set up the PsychLab - a Psychology research laboratory at IADT, which inspired and made the experiment possible using virtual reality.

2. Awe - an Expansive Emotion

Awe is a complex emotion in response to something unfathomable and greater than ourselves that can be experienced in a variety of circumstances if we are open to it. In principle, the vastness of a skyscraper or cathedral, a forest scene, or using a microscope, could all be awe inspiring or what is colloquially be known as 'mind-blowing'. In formulating an academic definition of this term, Keltner and Haidt concluded that awe involves at least two key processes: "perceived vastness

alongside an inability to assimilate an experience into current mental structures."[1] This inability to accommodate the experience can mean awe can be accompanied with some element of discomfort or unease.

Figure 1: View of the Northern Lights from Malahide, Dublin. Photograph by Brian Nitz, 2024. CC BY-NC 4.0.

However, research on the experience of awe has shown a number of measurable benefits. For example, Rudd, Vohs and Aaker[2] concluded that "Experiences of awe bring people into the present moment, and being in the present moment underlies awe's capacity to adjust time perception, influence decisions, and make life feel more satisfying than it would otherwise." Furthermore, Piff and his colleagues[3] found that feelings of awe can coincide with feeling more generous, helpful and relaxed. As mentioned above, the experience of awe can occur in many different circumstances and here we start with a focus on the impact of natural surroundings.

3. Nature and Awe

The vastness and aesthetic appeal of rare phenomena such as the northern lights are one of the nature-based experiences that have the potential to fascinate and induce high levels of awe.[4] Natural scenes and nature experiences generally have the

1. Dacher Keltner and Jonathan Haidt, "Approaching Awe, a Moral, Spiritual, and Aesthetic Emotion," *Cognition and Emotion* 17, no. 2 (January 2003): 297–314, https://doi.org/10.1080/0269993030229
2. Melanie Rudd, Kathleen D. Vohs, and Jennifer Aaker, "Awe Expands People's Perception of Time, Alters Decision Making, and Enhances Well-Being," *Psychological Science* 23, no. 10 (2012): 1130–1136, https://doi.org/10.1177/0956797612438731
3. Paul K. Piff et al., "Awe, the Small Self, and Prosocial Behavior," *Journal of Personality and Social Psychology* 108, no. 6 (2015): 883–899, https://doi.org/10.1037/pspi0000018
4. Neil Bone, "Atmospheric Phenomena," in *Aurora: Observing and Recording Nature's Spectacular Light Show* (New York, NY: 2007), 2, https://doi.org/10.1007/978-0-387-68469-7_1

potential to elicit positive emotions, including awe, through the process of absorption when attention is directed to fascinating features that fully engage the senses.[5] Furthermore, experiencing nature has been shown to have a restorative effect compared to 'built' environments, which can lead to increased creativity.[6]

Researchers have studied how Virtual Reality (VR) can create feelings of awe, especially in nature-based experiences. Chirico et al.[7] tested 42 participants in a study where they compared two types of videos: awe-inspiring scenes of tall trees and neutral scenes of hens in a field. These were shown either on a regular 2D screen or through an immersive 360° VR headset. The results showed that participants felt a stronger sense of awe and presence when watching the immersive VR videos compared to 2D videos. The researchers also found that awe-inducing videos led to changes in the body's parasympathetic system, which is linked to relaxation and emotional responses. However, they did not focus on how the novelty of VR might have influenced the results, even though only two participants had ever used a VR headset before.

Kahn and Cargile[8] expanded on this by using 360° VR videos of Earth from space to study the "overview effect" — a powerful sense of awe astronauts report when viewing Earth from orbit. Their study found that high-immersion VR created stronger feelings of awe compared to a similar 2D video. They also found that the feeling of "presence" — how real the experience felt — played an important role in creating awe.

4. Creativity

The creative process that starts with shifting perspective to 'think outside the box' has been termed lateral or divergent thinking.[9] This process allows an individual to create multiple different ideas or solutions to a problem that they are trying to solve by considering various alternative and previously unconsidered methods. The shift in perspective afforded by mindfulness was found by O' Cleirigh and Greaney[10] to lead to improved creativity for groups working on a task.

5. Matthew T. Ballew and Allen M. Omoto, "Absorption: How Nature Experiences Promote Awe and Other Positive Emotions," *Ecopsychology* 10, no. 1 (2018): 26–35, https://doi.org/10.1089/eco.2017.0044
6. Adam Palanica et al., "A Comparison of Nature and Urban Environments on Creative Thinking Across Different Levels of Reality," *Journal of Environmental Psychology* 63 (2019): 44–51, https://doi.org/10.1016/j.jenvp.2019.04.006
7. Alice Chirico et al., "Effectiveness of Immersive Videos in Inducing Awe: An Experimental Study," *Scientific Reports* 7, no. 1 (April 2017): 1218, https://doi.org/10.1038/s41598-017-01242-0
8. Adam S. Kahn and Aaron Castelán Cargile, "Immersive and Interactive Awe: Evoking Awe via Presence in Virtual Reality and Online Videos to Prompt Prosocial Behavior," *Human Communication Research* 47, no. 4 (2021): 387–417, https://doi.org/10.1093/hcr/hqab007
9. David H. Cropley, "Chapter 5: Process: Generating Creative Ideas," in *Creativity in Engineering*, ed. David H. Cropley (San Diego: Academic Press, 2015), 87–129, https://doi.org/10.1016/B978-0-12-800225-4.00005-7
10. Daire Ó Cléirigh and John Greaney, "Mindfulness and Group Performance: An Exploratory Investigation into the Effects of Brief Mindfulness Intervention on Group Task Performance," *Mindfulness* 6 (2015): 601–609.

Virtual environments used in VR research can be specifically tailored to induce significantly higher levels of awe based on interactivity and the environment itself, as discussed by Chirico, Ferrise, Cordella et al.[11] Their study found that VR environments were significantly more effective in inducing engagement and a feeling of physical presence within the VR space when compared to other media such as 360° videos. The study also suggested that the design of VR environments could be used to induce other positive or complex emotions within an individual.

The broaden-and-build theory[12] states that positive emotions, such as awe, can increase an individuals thought-to-action skills, allowing them to build up a variety of personal, physical and intellectual resources to draw from when a task arises. Chirico, Glaveanu, Riva et al.[13] further supported the idea of positive emotions enhancing creativity, with awe specifically being found to affect an individual's fluency, flexibility and ability to elaborate when producing ideas and solutions to tasks.

Taken together, this research highlights the ability of virtual environments to induce heightened creativity through specifically eliciting positive emotions such as awe. The ability of VR to immerse individuals in engaging and interactive environments opens up new possibilities for enhancing creative thinking and facilitating the development of more innovative problem solving skills.

5. Virtual Reality

A key question for this research is whether VR experiences of nature and awe can in some ways parallel the research described above. Virtual Reality (VR) can be defined as an experience where an individual uses a device, typically a Head Mounted Device (HMD), to view and interact with a simulated 3D environment. Such experiences can create immersive and interactive virtual scenarios that replicate the real world or can create completely fictional or imaginary environments for an individual to view and explore.[14]

VR has various developing applications in the modern world, ranging from uses in recreational experiences such as gaming and virtual tourism, to offering assistance in more practical areas such as the practice of medical procedures.[15] VR can also elicit a high level of presence, which is the perception of physical presence and

11. Alice Chirico et al., "Awe Enhances Creative Thinking: An Experimental Study," *Creativity Research Journal* 30, no. 2 (2018): 123–131, https://doi.org/10.1080/10400419.2018.1446491
12. Barbara L. Fredrickson, "The Role of Positive Emotions in Positive Psychology: The Broaden-and-Build Theory of Positive Emotions," *American Psychologist* 56, no. 3 (2001): 218-226.
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14. Jonathan R. Abbas et al., "What is Virtual Reality? A Healthcare-Focused Systematic Review of Definitions," *Health Policy and Technology* 12, no. 2 (2023): 100741, https://doi.org/10.1016/j.hlpt.2023.100741
15. Michael Wilkinson, Sean Brantley, and Jing Feng, "A Mini Review of Presence and Immersion in Virtual Reality," *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 65, no. 1 (2021): 1099–1103, https://doi.org/10.1177/1071181321651148

immersion determined by how convincing the experience is technically.[16] In support of the notion that VR can potentially induce emotions such as awe, Chirico et al.[17] found that immersive videos of tall trees significantly enhanced the self-reported intensity of awe and sense of presence compared to 2D videos. Furthermore, they found that the more immersive and interactive a simulated VR environment was made to be, the more intense the feelings of awe and apparent physical presence within the environment would be.

Pizzolante et al.[18] showed potential for VR induced awe, as their study showcased that awe experiences were not found to enhance divergent creativity in an individual, measured by Alternative Uses Task (described later), after just one exposure. However, significance was noted in scores from one week later and cognitive fatigue was noted as a possible factor for this finding. This gives further impetus for the present research, to try and help unravel the possible links between awe and creativity in a VR setting.

The use of VR in a lab setting allows us to compare the experience of different environments while allowing for researchers to capture real-time behavioural and psychological responses to awe, offering richer and more reliable quantitative data than potentially more qualitative individual self-reports from memory or anecdotal experiences.

6. Key Questions for Research

VR allows for researchers to precisely control and measure individuals' immediate responses to different environments - such as immersive 3D versus flat 2D, or awe-inducing nature versus everyday settings. Could experiencing a virtually expansive scene lead to a parallel broadening of the mind in beneficial ways? Technological advancements in VR provide opportunities to investigate the effects of high-intensity awe and creativity within a controlled setting.

Many factors in this study are complex, measured subjectively, and potentially influenced by factors not accounted for directly in the experiment such as cultural or individual differences. Research on awe is growing but it is a relatively under-researched topic compared to other emotions. While existing literature supports the hypotheses that VR can simulate awe and that virtual nature-based awe experiences enhance creativity, these relationships have not been widely tested together. This study explores the interplay between awe and creativity while controlling for immersion and the novelty of the VR experience.

16. Chirico et al., "Effectiveness of Immersive Videos in Inducing Awe."
17. Marta Pizzolante et al., "Awe in the Metaverse: Designing and Validating a Novel Online Virtual-Reality Awe-Inspiring Training," *Computers in Human Behavior* 148 (2023): 107876, https://doi.org/10.1016/j.chb.2023.107876
18. Mamtha Prajapati and Sudesh Kumar, "Virtual Reality Revolution in Healthcare: a Systematic Review," *Health and Technology* 15 (2025): 231-242, https://doi.org/10.1007/s12553-025-00941-3

7. Investigating the Effects in the Psychlab

The PsychLab is a Psychology research and testing laboratory located in the Dun Laoghaire Institute of Art, Design + Technology (IADT). This facility empowers students to conduct hands-on research projects with a range of technologies and dedicated technical support. This study utilized the PsychLab and its equipment, which included a PlayStation 5 and PlayStation VR2 headset.

The PlayStation VR2 headset presented participants with one of two simulated environments for the experiment: A Built Environment (BE) (Indoor Pool) or an awe-inducing Natural Environment (NE) (Northern Lights). Both conditions maintained the same level of graphical realism, immersion, and presence, ensuring control over these factors, as well as the novelty of the VR experience. After VR exposure, participants completed psychological scales and performed a timed divergent thinking creativity task. The study followed the procedure outlined in Figure 2, with the experiment described in more detail in the next section.

8. The Experiment

Volunteers in the experiment did not receive any incentive to participate. Technical testing (N=8) was conducted to familiarise the researcher with the PsychLab equipment, and to test if the stimuli conditions and the study design were valid. Pilot testing (N=10, with one participant excluded due to incomplete form submission) allowed for refinement of experiment timing, manipulation checks of stimuli and measurement.

It was important to inform potential volunteers of the inherent risks associated with virtual reality experiences before they decided to participate, and to include a warning for certain medical conditions such as epilepsy and vestibular or balance related conditions. Cybersickness, similar to motion sickness, occurs when the brain struggles to reconcile visual input with the body's sense of position in space. It is often triggered by time lags between a user's actions and the system's response. While uncomfortable, it is generally a short-lived reaction.[19] While future studies may consider using online questionnaires to screen for potentially vulnerable participants, this study ensured informed consent by clearly listing exclusion criteria in recruitment materials, including posters, social media posts, and the online booking form description.

Following feedback from a pilot participant who expressed surprise at the water-based setting, a content note was added to highlight the presence of water and night scenes in the experimental conditions. This content note was provided to participants during the consent process, giving them with another opportunity to withdraw before wearing the PlayStation VR2 headset. Participants were randomly assigned to one of two VR environment groups to control potential confounding

19. Irene Connolly et al., *An Introduction to Cyberpsychology*, ed. Gráinne Kirwan (London and New York: Routledge, Taylor & Francis Group, 2016), 274.

variables, such as individual differences and personality traits - including awe and creativity. Random assignment protocol involved alternating every second participant to the control condition. Participants used an online form to choose their experiment time slot, which further randomized the assignment of the VR conditions. The AUT task was only conducted once after the VR experiment to avoid priming for creativity.

A PlayStation 5 console and PlayStation VR2 headset were used to run a simulation game called Kayak VR: Mirage.[20] This game features a first-person perspective and embeds participants in a selected environment - two of which were chosen for comparison in this study. Participants viewed one of two virtual environments, either an 'indoor swimming pool' as a Built Environment (BE) (Figure 3) or 'arctic at night' as a Natural Environment (NE) (Figure 4). The quality of computer-generated imagery, perspective, and level of realism was standardized since both environments were featured from the same software. To ensure a consistent visual experience, each participant was placed at the same starting point of each environment without controllers, preventing movement through the game and allowing them to focus on the stimuli of interest. The VR experiment lasted two minutes for each condition.

After exposure to the VR environments, participants were invited to answer questions from an adapted version of the Awe Experience Scale (AWE-S)[21] using the dimensions of time, physical reaction, vastness and connectedness. Example questions from the scale included "I felt my eyes widen" and "I had the sense that a moment lasted longer than usual." This was balanced by including a single self-report awe question, previously validated in related research but insufficient alone.[22] Additionally, a shortened version of the Augmented Reality Immersion Questionnaire (ARIQ)[23] was included.

Although the ARIQ was designed for augmented reality (AR) environments, we used it in the present study to measure the subscales of interest, presence, flow and novelty. Questions included "I felt what I was experiencing was something real, instead of a fictional activity" and "I liked the activity because it was novel." Participants were asked about their familiarity with virtual reality and the extent to which the experience was novel, as these factors could confound the awe experience.

Divergent creativity was measured using The Alternative Uses Test with two separate two-minute tasks. Participants were asked to list unusual uses for everyday objects,

20. David B Yaden et al., "The development of the Awe Experience Scale (AWE-S): A Multifactorial Measure for a Complex Emotion," *The Journal of Positive Psychology* 14, no. 4 (2019): 474–488.
21. Arend Koopmans, Jetse Koopmans, and Leon Van Oord, "Kayak VR: Mirage," February 2023, https://kayakvr.com/
22. Yiannis Georgiou and Eleni A. Kyza, "Augmented Reality Immersion Questionnaire" (APA PsycTests database record, 2017) https://doi.org/10.1037/t59295-000
23. J. P. Guilford et al., "Alternate Uses (ALTUS)" (APA PsycTests database record, 1960), https://doi.org/10.1037/t06443-000

in this case a fork and a brick. This test was developed by Guilford[24] and measures creative solutions through four distinct categories. The first, fluency, is a measure of how many other uses an individual can think of for the item, with the second category originality a measure of how different these other uses are from each other. Flexibility measures the assortment of ideas that have been come up with in total to showcase a range of uses, and the final category, elaboration, being used to measure the level of detail and development each idea or solution showcase. As the scoring for each of these categories can be subjective, the scores were produced by human raters blind to the condition of the answers. There are also AI research tools that exist to standardise results.

At the end of the experiment, participants were asked for consent to retain their anonymised data for future analysis. They were presented with a debriefing screen, which provided a full description of the study. Each participant was offered an opportunity to ask questions and were thanked for their participation. This study was approved by the IADT Psychology Ethics Committee (PEC).

9. Preliminary Findings

In this section, we present some preliminary findings and observations of the participant's responses in this controlled setting. Participants were asked to provide optional feedback on what struck them most about the VR experience. The initial analysis of this data revealed some themes and insights (Figure 5).

9.0.1 Preliminary Themes

1. **Realism of details** - Participants noted fine details and realism in the visuals, especially water and sound.
2. **Sense of presence and immersion** - Many participants described wanting to explore more and a sense of feeling deeply engaged.
3. **Emotional engagement** – Participants used words such as 'awe', 'exciting', and 'amazing', indicating strong emotional reactions.
4. **Connection to nature** – Verbal references to the natural environment, such as 'water', were common.

9.0.2 Preliminary Insights

1. **Presence** - Participants reported instinctive desires to interact with objects, demonstrating a sense of embodiment.
2. **Emotion** - VR experiences can have a relaxing effect on people. Certain settings, such as deep water, can evoke brief feelings of fear. Fear is balanced by enjoyment and reminding yourself that the simulated environment is not real.

24. Michelle N. Shiota, Dacher Keltner, and Amanda Mossman, "The Nature of Awe: Elicitors, Appraisals, and Effects on Self-Concept," *Cognition and Emotion* 21, no. 5 (2007): 944–963, https://doi.org/10.1080/02699930600923668

3. **Exploration** – Curiosity drives engagement, encouraging users to explore the environment. Key focal points - such as objects in the pool or the northern lights - guide participant attention and enhance the overall experience.
4. **Immersion** - Realistic visuals enhance the sense of being in the virtual environment. Spatial audio increases feelings of presence and realism.

9.0.3 Participant quotes from the Built Environment (BE) condition:

"As an animation student, I found the way the environment and especially the water was rendered to be fascinating - because I was focused on the technical aspect of the experience, I probably wasn't able to fully immerse myself in the activity."

"The water noise and visuals were so realistic I felt like I was actually there. The pool felt very empty with no one else there, as I am used to swimming lessons [which] involve a large amount of people, noise and chaos. It was almost a nostalgic feeling to be there with no one else."

9.0.4 Participant quotes from the Natural Environment (NE) condition:

"The Northern Lights were the thing that struck me the most as it shimmered very realistically."

"I felt really transported to the area around me and was in complete awe of my surroundings and how realistic it felt. I wanted to take every moment in, in case it is something I never get to experience in real life - as I have always wanted to see the northern lights."

9.1 Results

An independent samples t-test (one-tailed) was conducted to compare mean awe scores between the Nature Awe (N = 20) and Built Neutral (N = 20) VR conditions. Participants in the nature awe condition reported higher awe, $t(38) = 1.88$, $p = .034$ (one-tailed), mean difference = 0.68, 95% CI [–0.05, 1.40], $d = 0.59$, 95% CI [–0.05, 1.22], representing a medium effect size. A two-way between-groups ANOVA was conducted to examine the effects of VR condition and awe level (low, medium, high) on creativity. There was no significant interaction between VR condition and awe level on creativity, $F(2, 40) = 0.843$, $p = .439$, partial $\eta 2 = .047$.

10. Conclusions and Future Directions

10.1 Overview

The overall findings were that participants found the Natural Environment (NE) condition (northern lights) to be more awe-arousing than the Built Environment (BE) condition (indoor swimming pool). Furthermore, the Natural Environment was

as immersive, but more novel than the Built Environment. Data collected suggests immersion could be a more suitable covariate for awe studies than creativity, which did not differ across conditions in this study. This study found a strong positive relationship between immersion and awe, suggesting that immersion may play a key role in awe elicitation during VR experiences. Previous research found a difference in awe experienced by VR conditions.[25] While it was not a direct hypothesis, a manipulation check found a significant difference in awe between VR conditions with a medium effect size. Although the awe manipulation reached statistical significance ($p = .034$) it should ideally be replicated with a larger sample size in future studies.

The Augmented Reality Immersion Scale was used to measure immersion and, although modified, showed high internal consistency. A positive relationship was discovered between immersion and awe through correlation analysis. Detection was possible due to similar awe scores and immersion effects across conditions. To further explore this relationship, immersion was compared to low and high awe data and revealed a difference in means with a large effect size, suggesting immersion was experienced at higher levels for participants who also experienced stronger feelings of awe. Participants reporting stronger awe experiences also report higher levels of flow, interest, and presence as dimensions of the immersion scale.

Although novelty was the intended covariate, data collected found novelty does not significantly correlate with awe. In addition, novelty was not measured robustly in this study due to the low internal consistency of the two-question scale. Because of its strong correlation with awe and higher internal consistency, immersion would also be a reasonable covariate for future studies to consider.

10.2 Strengths and Limitations

The study design was guided by existing research across multiple domains including creativity, environmental psychology, and human factors as well as by pre-pilot feedback. Conscious efforts were made to control variability across conditions with consistent, detailed procedures developed through structured testing phases. Random assignment resulted in a reasonably balanced distribution of participants by prior VR experience across both conditions but not by age. This balance helped reduce the risk that familiarity or novelty with VR systematically biased the results. This study is easily replicable due to widely available commercial VR software. Test instruments such as the awe and immersion scale, although altered, maintained high internal validity.

The use of an open source, empirically tested, novel AI divergent creativity task scoring tool and experimenting with AI for flexibility scoring with the addition of human inter-rater checks, lowered potential for bias in scoring and making divergent creativity studies replicable and accessible for smaller-scale research projects.

25. Alice Chirico et al., “Effectiveness of Immersive Videos in Inducing Awe.”

The study took place in an art and design institute, which may have introduced a confounding influence due to the high level of creative courses. Trait creativity was not measured or controlled for, and pre-experiment creativity tasks were not used to avoid potential priming effects in the creativity task. The low reliability and validity of Cronbach's novelty measures prevented full exploration of research questions, which meant novelty could not be included as a covariate as planned. A possible confounding factor of the VR software was identified through qualitative responses: the presence of water and realism in both VR conditions. While this may have enhanced immersion and awe in the neutral condition, it could also have inadvertently influenced the awe condition.

10.3 Future Research

Researchers in this area should consider the experiment to be time intensive (30-40 minutes per participant), which would be expensive to run, resource, and scale up. Although this study focused on creativity, future research could include other cognitive outcomes linked to awe, such as effects on memory or attentional scope and the effects of awe exposure over time.

Participants in both conditions (23% control, 20% experimental) reported that the experience was peaceful, calm, and relaxing. This may facilitate experimental mindfulness research.

10.4 Theoretical and Practical Implications

This study may have uncovered an interaction of interest between immersion and high arousal states, which warrants future research. These findings could inform positive psychology and therapeutic interventions delivered through VR as well as real-world applications in game design and entertainment. Results are particularly relevant to VR game design in terms of the participant reaction to water and reporting immersion and presence.

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