Climate Change on Your Plate: A VR Seafood Buffet Experience

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ABSTRACT

The use of virtual reality (VR) to depict climate change impacts is a popular strategy used by environmental, news, and political organizations to encourage pro-environmental outcomes. However, despite widespread dissemination of immersive content, climate change mitigation efforts remain tepid. In response, we present a VR simulation conveying the adverse effects of climate change in a personally-relevant fashion. The "Virtual Seafood Buffet" experience allows users to select from dozens of lifelike virtual seafood items and experience the degradation of that particular species based on projected climate change impacts. The developed simulation is proposed as an intervention designed to encourage climate change mitigation efforts. An overview of the simulation, its purpose, and directions for future research are outlined herein.

Keywords: Climate change, food, virtual reality.

Index Terms: Human Computer Interaction (HCI), Virtual reality

1 INTRODUCTION

Non-government organizations (NGOs) have increasingly relied on new media platforms to raise awareness of environmental issues, climate change chief among them. Despite widespread press coverage leading to a more informed public on environmental issues, international leaders note that there remains a general lack of urgency and concern [6]. Environmental communication scholars identify various reasons for this, including the "not-in-my-backyard" (NIMBY) effect wherein individuals have greater concern for adverse events that are proximal and personally relevant to them [2]. To remedy this psychological distancing and make the issue of climate change relatable to audiences' "here-and-now", several NGOs have turned to the use of visual imagery as a solution. Specifically, virtual reality (VR) platforms are increasingly being used to convey the effects of climate change and spark urgency among the public, as evidenced by investments from organizations like National Geographic and the United Nations [8].

VR is an optimal medium with which to convey such effects due to the elicitation of presence, or a sense of being there [11]. Presence has been shown to contribute to a reduction in psychological distance between users and environmental threats. Specifically, recent scholarship has supported the assumption that experiencing the consequences of environmental threats in VR make the subject matter (issue) seem psychologically closer to the user [1], [5]. Indeed, most, if not all, of the commercially-available VR content dedicated solely to environmental issues attempts to elicit proximity to the threat by placing the user in an "accelerated future" where a user's immediate actions manifest long-term, future reactions in the moment (e.g., immediate sea erosion, sea-level increases). Ultimately, this approach leverages VR's affordances of interactivity and presence to convey the spatial dimension of climate change impacts. However, VR may be better suited to manifest climate effects in ways beyond visual changes to the user's spatial environment.

One such use of VR to address climate change impacts is by simulating effects related to the culinary (or gustatory) dimension of the human experience. That is, using VR to demonstrate the degradation of food quality on users' virtual plates. The importance of food cannot be overstated as it serves a primary biological role in human survival. Yet, the influence of food extends beyond sustenance, as cognitive neuroscience research has identified the profound influence that food imagery (or virtual food) can have on psychological and behavioral outcomes [13]. In the aforementioned paper, Spence introduces the term "visual hunger", which identifies how behaviors can be activated by interacting with digital representations of food across modalities (e.g., virtual reality).

The potential psychological impact of exposure to virtual food is further accentuated when considering that (a) visual changes in food appearance (e.g., color) impact human desires and behaviors [4], [7], and (b) VR can display such changes in appearances instantly as a result of user inputs. In this way, individuals may be presented with a virtual plate of their favorite foods, have a favorable physiological and behavioral response, and then experience an equally reprehensible reaction as a result of those foods degrading in terms of appearance. This research project is particularly interested in investigating whether connecting the degradation of a user's virtual food to climate impacts can influence pro-environmental behavior in both the short- and long-term.

The strength of such an effect, we argue, would hinge on (a) the degree to which the user feels endowed with the degraded food, and (b) the level of personal relevance that food has to the user. As it relates to the former factor, research has shown that VR experiences can lead to an illusory sense of ownership of virtual objects [12], [2]. As such, grabbing and interacting with virtual food in VR may constitute sufficient action to elicit illusory endowment. Related to the latter factor (personal relevance), providing the user with an ability to select personally-relevant (or desired) food choices would accomplish such a task. Indeed, communication scholarship has long-identified the importance of customization, or tailoring content to match a user's preferences, in influencing attitudes and behaviors. As customized content is perceived as more self-relevant [3], and thereby more important compared to a non-customized equivalent, we predict that degradation of a customized plate of food would hold more weight in such a scenario. Taken in conjunction with previous work supporting the efficacy of VR to facilitate life-like human-food interaction scenarios (e.g., virtual buffets) [9], this project seeks to address this question and test the aforementioned hypothesis.

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Figure 1: Overview of the simulation, including the welcome (left), food selection (middle), and food degradation scenes (right).

2 The Seafood Buffet Simulation: Overview

The buffet, named "High Tide Seafood Buffet," takes place in a fictional coastal high-rise restaurant overlooking the ocean and was created using Unity 3D software for use with the HTC Vive headset. As users begin the simulation they are greeted by a host at the entrance to the restaurant. At this point, the host informs the user that they are happy to have them visit and proceeds to inform them that they will first go over the controls. In the next scene, the user is presented with a table containing a plate, tongs, a menu, and a sample of a food item (shrimp). The dialogue and text visible to the user walks them through a tutorial of how to select food. The simulation requires the user to equip both Vive controllers, using each to grab separate items throughout the tutorial. For example, the user's right hand can be used to grab and hold the plate, while the other hand is used to equip the tongs, which are then used to grab the shrimp and place it on the plate. Once the user accomplishes this task, they may then complete the tutorial portion and proceed to the start of the food selection.

After the tutorial portion, the user is once again greeted by the host at the onset of the buffet set-up. The buffet set-up features over dozens of seafood items, all of which are interactable and selectable by the user. Once the host informs the user to begin his/her selection, the user can walk over to the plate, grab-and-hold a plate, and peruse the offerings, selecting whichever items he/she wishes. The user may remove/select food items using naturalistic gestures, as well as walk around naturally within the designated space. As the simulation will take place in a designated lab space, users will have ample room to move around and inspect items in the buffet. Once the user has filled his/her plate with five (5) food items, the host will ask whether that is their final selection. If the user chooses to proceed, the host will escort the user to their reserved table.

After the user is seated at the table, the host will inform the user that, prior to enjoying their meal, they will be presented with a short immersive feature as part of the restaurant's entertainment programming. When the user indicates that they are ready, the simulation will then trigger the launch of the Stanford Ocean Acidification Experience VR simulation. This interactive simulation is a roughly 8-minute experience where users experience the effects of ocean acidification on marine life. This content, while commercially available to all consumers via the online store *Steam*, is being incorporated into this simulation in collaboration with the developers.

After the user completes the Ocean Acidification Experience, he/she returns to their seat and is prompted (via audio) to inspect their food/plate. Upon inspection (i.e., the user picks up the plate to look at the food), this triggers a degradation animation wherein the selected food models chosen by the user are visually depreciated. That is, color richness is significantly reduced, and the overall quality of the model is diminished. This is done to convey how ocean acidification is projected to impact seafood quality. After the degradation animation, a short audio clip plays explaining the effects, followed by the presentation of an interactive display which allows the user to see how the severity of ocean acidification's impact on specific seafood (including those they selected). After evaluating the display, a final dialogue is prompted, with a voice-over informing the user that, while ocean acidification projections are grim, there are still actions they can take to help remedy the situation. The host ends the simulation by thanking them for their visit and prompts them to come back again sometime.

3 Conclusion and Future Research

This simulation was developed to examine how VR can simulate adverse environmental effects to audiences in a personally-relevant fashion, and how such experiences may contribute to climate change mitigation efforts. By creating an interactive buffet where users fill their plates with desired seafood, and subsequently experience its degradation, we argue that the experience creates a visceral connection to issue of climate change, contributing to pro-environmental outcomes. This content will also be used in future experimental research to examine other aesthetic factors associated with food degradation, including size, texture, and the use of audio and haptic cues, among others.

References

[1] S. J. (Grace) Ahn, J. N. Bailenson, and D. Park, "Short- and long-term effects of embodied experiences in immersive virtual environments on environmental locus of control and behavior," *Comput. Human Behav.*, vol. 39, pp. 235–245, 2014.

[2] H. G. Hoffman, "Physically touching virtual objects using tactile augmentation enhances the realism of virtual environments," in *Proceedings. IEEE 1998 Virtual Reality Annual International Symposium (Cat. No.98CB36180)*, pp. 59–63.

[3] S. "Sri" Kalyanaraman and B. W. Wojdynski, "Affording Control," in *The Handbook of the Psychology of Communication Technology*, Chichester, UK: John Wiley & Sons, Ltd, 2015, pp. 425–444.

[4] R. Mai, C. Symmank, and B. Seeberg-Elverfeldt, "Light and Pale Colors in Food Packaging: When Does This Package Cue Signal Superior Healthiness or Inferior Tastiness?," *J. Retail.*, vol. 92, no. 4, pp. 426–444, Dec. 2016.

[5] D. M. Markowitz, R. Laha, B. P. Perone, R. D. Pea, and J. N. Bailenson, "Immersive Virtual Reality Field Trips Facilitate Learning About Climate Change," *Front. Psychol.*, vol. 9, Nov. 2018.

[6] S. C. Moser, "Reflections on climate change communication research and practice in the second decade of the 21st century: what more is there to say?," *Wiley Interdiscip. Rev. Clim. Chang.*, vol. 7, no. 3, pp. 345–369, May 2016.

[7] T. Narumi, T. Kajinami, T. Tanikawa, and M. Hirose, "Meta cookie," in *ACM SIGGRAPH 2010 Posters on - SIGGRAPH '10*, 2010.

[8] S. J. O'Neill and N. Smith, "Climate change and visual imagery," *Wiley Interdiscip. Rev. Clim. Chang.*, vol. 5, no. 1, pp. 73–87, Jan. 2014.

[9] S. Persky *et al.*, "Effects of Fruit and Vegetable Feeding Messages on Mothers and Fathers: Interactions Between Emotional State and Health Message Framing," *Ann. Behav. Med.*, Nov. 2018.

[10] L. Scannell and R. Gifford, "Personally Relevant Climate Change," *Environ. Behav.*, vol. 45, no. 1, pp. 60–85, Jan. 2013.

[11] M. Slater, "Presence and The Sixth Sense," *Presence Teleoperators Virtual Environ.*, vol. 11, no. 4, pp. 435–439, Aug. 2002.

[12] M. Slater, "Inducing illusory ownership of a virtual body," *Front. Neurosci.*, vol. 3, no. 2, pp. 214–220, Sep. 2009.

[13] C. Spence, K. Okajima, A. D. Cheok, O. Petit, and C. Michel, "Eating with our eyes: From visual hunger to digital satiation," *Brain Cogn.*, vol. 110, pp. 53–63, Dec. 2016.