Special Issue on Arts, Aesthetics, and Performance in Telepresence

Guest Editors' Introduction: Homo Ludens in Virtual Environments

1. Introduction

"The fate of our times is characterized by rationalization and intellectualization and, above all, by the disenchantment of the world."—Max Weber, 1904/1905

Weber diagnosed the previous era rather precisely. People worked hard with a given vocation. Play was separated from work and people were not likely to play any more. The world was disenchanted and Homo Ludens evolved into Homo Sapiens. The magic circle[1] disappeared. However, this magic circle is recently returning to our lives through emerging technologies. People enjoy hunting monsters in their garden (e.g., Pokémon Go) and children paint in 3D space (e.g., Tilt Brush). People's imaginations are encouraged by the technologies and play might be restored to our lives.

The relationships among art, technology, and science are much stronger today than may be immediately apparent. The connections between artists and scientists have waxed and waned in the eighteenth and nineteenth centuries. However, they have been reintegrated in contemporary art (Packer & Jordan, 2001). Considering that the original meaning of aesthetics is the study of our perception of the entire environment (not just the study of an "object of beauty") (Bolter, Engberg, & MacIntyre, 2013), we are likely to acknowledge that technological advances have accelerated the advent of new aesthetics. Thanks to new technologies, we can expand the perceptual experiences of our existing senses and can even create novel perceptual dimensions that have never been imagined—new *presence*. Given the paradigm shift from cognitivism into embodiment, the human body now has more opportunity for representation in computing (gestural interaction, tangible user interfaces) than at any previous time. In this line, virtual reality, which provides presence and immersion, is becoming more important for embodied interactions. Scientists and technologists can learn interaction techniques and strategies from body expression experts—artists. Meanwhile, virtual reality can provide an integrative, dynamic platform for arts and performances: a living synthesis of what German composer Richard Wagner once dreamed in his vision of *Gesamtkunstwerk*—a comprehensive work of art. We hope this special issue can serve as a good step towards that goal.

1. The space in which the normal rules and reality of the world are suspended and replaced by the artificial reality of a game world.

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2. Aesthetic Computing

We encourage our readers to view this special issue from the perspective of Aesthetic Computing, which is defined as "the application of art theory and practice to computing" (Shem-Shaul et al., 2003). When we have an approach encouraging a more cultural, personal and customized set of aesthetics in computing, we can explore more creative and innovative media for software and mathematical structures; make computing more accessible to diverse populations so that they can understand the concept of computing and utilize it more readily; and promote personalization and customization of computing structures. We believe that these benefits cause a chain reaction. The application of aesthetics to computing has brought about new media for computing and mathematical representations. The new media or representations of the computing process and its structure play an important role to process, encode, and understand the information. The evolution of the embodiment of computing from command line interfaces, to graphic user interfaces, and to tangible user interfaces proves that such new media make computing more accessible. Consequently, this pervasiveness of computing resulted in easy personalization and customization and thus, computing can ultimately be used in our everyday

lives for "making special"—fundamental meaning of art (Dissanayake, 2003).

Based on this aesthetic computing approach, on the one hand, computer scientists obtain more options in aesthetics accompanied by enhanced comprehension and motivation. On the other hand, artists benefit from computational thinking and its underlying mathematical structures (Fishwick, 2006). In other words, from these reciprocal interactions between computing and aesthetics, computing can be enriched by aesthetic theory and practice while simultaneously facilitating the formation of new art and aesthetics by providing novel media and platforms for art.

3. Embodiment and Virtual Environments

As discussed above, aesthetic computing is deeply related to embodiment. By complementing or replacing the traditional cognitivism, embodied cognition has rapidly emerged as a new theoretical paradigm in cognitive sciences (see the special issue in TOPICS; Davis & Markman, 2012). This has also brought up a new paradigm, embodied interaction, in Human-Computer Interaction (HCI) (see the special issue in TOCHI; Marshall, Antle, Van Den Hoven, & Rogers, 2013). Theories of embodiment pose new topics that designers and researchers can consider in their interaction design (Klemmer, Hartmann, & Takayama, 2006). (1) Users can learn through doing. They think by gesture and movement and identify implicit constraints and problems easily. (2) Users can act *through* an artifact, rather than act *on* it. They perceive the artifact as an extension of their body, rather than an independent object. This explains why emotions and affect are getting more important in interaction design (Jeon, 2017). (3) Users can easily perceive the status and response of other users as the distributed cognition theory (Hollan, Hutchins, & Kirsh, 2000) suggests. It facilitates learning by participating in a community of practice and enhances coordination based on peripheral participation. (4) Embodiment allows users to prepare for risk and surprise. They can pay more attention to their activities and be responsible for their decision making because the consequences of their decisions are more visible. (5) Embodiment provides an opportunity to integrate physical and digital worlds, which was previously unavailable. This creates malleable materials and experiences, whether we call it virtual reality, augmented reality, or mixed reality. Of course, it would not be strange to replace "users" with "artists" in all these statements.

Virtual environments have a reciprocal relationship with full embodiment. Virtual environments with rich sensory information offer an opportunity for users to be immersed in the task and context so they explore the environment using their entire body as if the situation is real. At the same time, their embodied interaction with the virtual environment system will again increase feelings of presence by stimulating their motor areas as well as sensory areas in their brain. Acting in the virtual environment beyond simply seeing the computer display will certainly boost artists' and users' immersion into a new virtual space. Also, it will allow them to engage more with their tasks or activities.

4. Presence and Telepresence

Traditionally, literature has used a space metaphor about presence, such as *being there* (Minsky, 1980) or *feeling of being present in an environment other than one the person is actually in* (Sheridan, 1992). One of the critical values of a virtual environment is that it can not only provide the space for representation of reality, which is one of the original goals of art, but also provide the *tweaked* version of reality. This opens up the new possibilities for art works. As drawings of romanticism mimicked neo-classicism, contemporary art is mimicking the work of romanticism but also tweaking it (e.g., "Le Déjeuner sur L'herbe" by Édourard Manet in 1863 vs. "Le Déjeuner sur L'herbe, Les Trois Femmes Noires" by Mickalene Thomas in 2010; as Manet untraditionally had a lady sit together with men on the grass and stare forward, Mickalene also had women sit together on the grass instead of men). In the virtual environment, for example, this tweaking task can be more flexible, and the tweaked version and the original can even be presented at one time or superimposed to compare and contrast (Jeon, Landry, Ryan, & Walker, 2014).

This type of activity can be further expanded by virtual presence. Jeffrey Shaw once described interactive arts as a virtual space of images, sounds, and texts (Kwastek, 2015). Inherently, interactive art implies virtual presence. The advancement of network technologies enabled virtual presence or telepresence. Since futurists championed radio as a new art format in their manifesto in 1933, artists have consistently employed many other network media for their arts, including satellites, fax machines, BTX systems, mailboxes, the Internet, and mobile data networks (Kwastek). This telepresence also enabled real-time cooperation among artists. For example, even though music is a very time-sensitive genre of art, networked music can be played in different locations at the same time. This type of work goes beyond the traditional meaning of "transmitting information" in arts and *interaction* happens remotely.

5. Interaction and Interactivity

Another core concept of this special issue is *interaction*. Like other terms, the concept of interaction has included many different meanings and has consistently evolved. For instance, behavioral psychologists focused on the stimulus–response relationship as a reaction in our bodies and sociologists looked at a communicative process, where people share their experience. Norbert Wiener (1950), in his cybernetics, extended this construct by varying the types of feedback and by including reflexive reactions and systems that are capable of learning. This implies that complex dynamic systems can include interpretation, which mediates between actions and reactions.

Kwastek (2015) listed the fundamental features of interaction as real-time exchange and presence; control and feedback; and selection and interpretation processes. However, she acknowledged that not all these are necessary components to make up the "interactive process." For example, the concept of real-time exchange is not requirement and also more passive interaction is possible rather than active control.

Rafaeli (1988) refined the concept of full interactivity. He has suggested that a distinction between quasi interactivity (e.g., two-way communication or reactive communication) and full interactivity depends on the nature of the communication responses. Both reactive and fully interactive communications require that communicants respond to each other. However, with quasi interactivity, the content of response may have a reaction to previous messages, whereas full interactivity acknowledges prior responses. In other words, to contain full interactivity, responses should incorporate references to the content already exchanged and conjure up memorable interactive exchanges. Therefore, we want to emphasize interpretation and recurrence in interaction because without this concept, any vending machine can be considered an interactive system.

6. Summary of Contributions

The manuscripts submitted to this special issue have undergone a rigorous peer-review process in which each manuscript was reviewed by at least two independent reviewers. In total, 12 manuscripts were submitted to the special issue. Guest editors performed meta-reviews on the papers in each round of reviews (2–3 rounds of review), and finally the five best articles were selected for publication. The articles of this special issue incorporated and elaborated upon some of the critical concepts we have discussed.

Carlson, Sun, Cuykendall, Lantin, Schiphorst, and Corness described the project done by collaboration between researchers and artists in the article "Beyond the Here and Now: Exploring Threaded Presence in Mediated, Improvised Performance." The authors explored the concept of presence by examining performers' experiences in an improvisational, telematics performance and coined the term, "Threaded Presence," which bridges the gap between "situated" and "extended" presence. They described how technology can contribute to the entire experience of performance by serving as another performer.

Rumori and Marentakis explored the potential of spatial sound technology in the intersection of artistic investigation and scholarly research in the article "*Parisflâneur*. Artistic Approaches to Binaural Technology and Their Evaluation." The authors provided the case study and its iterative improvements through the

usability test. They showed that the full potential of immersive media can be achieved only by investigating technology within the context of aesthetic experience.

The next two articles are dedicated to creating interactive artificial agents. In the article "Flow Fields and Agents for Immersive Interaction in *Mutator VR: Vortex,*" Putnam, Latham, and Todd discuss the challenges in creating *Mutator VR: Vortex*, a virtual reality experience based on interaction with semi-autonomous agents. The authors took aesthetic inspiration from organic forms found in the natural world. To this end, the authors selected curved-based synthesis and flow grains as mathematical constructs to provide a natural integration of modalities, which resulted in a sense of agent autonomy and playful and emergent interactions.

Ch'ng, Harrison, and Moore also made a mixed-reality art installation of artificial life of agents, in the article "Shift-Life Interactive Art: Mixed-Reality Artificial Ecosystem Simulation." Their artistic focus was to explore the parallels between the human thinking process and computer process, both of which are non-linear systems. The authors explored further people's perceptions and mind states when they shift their attention between the virtual world and the real world. They merged the physical and virtual world as the mixed reality system and integrated artificial life, ecology, physical sensors and participants' interaction.

A more ecological approach is described in the last paper, "The Networked Sensory Landscape: Capturing and Experiencing Ecological Change Across Scales," by Mayton, Dublon, Russell, Lynch, Haddad, Ramasubramanian, Duhart, Davenport, and Paradiso. The authors explored how ubiquitous sensing can make the natural environment artistic and interpretable, which can facilitate our understanding and experience of ecology. In their long-term research, they integrated multitude components, including sensor hardware, web services, public user interfaces, and UAV, VR/AR, and wearable devices.

7. Conclusions

Fishwick (2006) proposed three broad topics in aesthetic computing: modality, quality, and culture. We have witnessed how virtual environments can expand modalities of computing and art in this special issue. Aesthetic qualities, such as mimesis, symmetry, complexity, parsimony, minimalism, and beauty, have been transferred to/combined with computing. These aesthetic qualities will be further enhanced when integrated with more diverse, culture-specific approaches. Various traditions and philosophies in different cultures can be applied to aesthetic computing by adding new frameworks of both implementation and analysis. This attempt will simultaneously make both computing and art more accessible to each person.

We very much appreciate all the authors and reviewers for their contributions to making this special issue. We hope that you can enjoy this magic circle and reclaim "Homo Ludens" for a moment.

"Any sufficiently advanced technology is indistinguishable from magic."—Arthur Clarke, 1973

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