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ABSTRACT

This paper brings together multiple theories regarding the role of the senses in the construction of embodied experiences. Embodiment, we suggest, is not a visual or auditory phenomenon, but rather an ontological one, that is, one of being. Employing accounts from cognitive science, existential phenomenology, and interactive art, we argue that the inner senses have a special role in the construction of these ontological experiences.

We present an interactive artwork titled *Taro(t)ception* designed to elicit an embodied aesthetic experience and heighten awareness of inner states. As well as being an artwork, *Taro(t)ception* is an exploration: the system provides a tool through which we can explore proprioceptive illusions in order to develop methods for transforming viewers' experiences of their own bodies and their own movements.

Our approach attempts to bridge the gap between third-person investigations, which rarely take in to account the quality of experience, and first-person accounts, which are easily dismissed as anecdotal.

Categories and Subject Descriptors

H.5.2. [User Interfaces] Interaction Styles, Input Devices and Strategies, Theory and Methods

General Terms

Theory, Experimentation

Keywords

Interactive Art, Embodiment, Phenomenology, Movement, Interoception, Proprioception, Emotion, Ontology, Cognition

1. INTRODUCTION

Embodiment is not a phenomenon achieved through any one sense; rather, it is an ontological one, one of *being*. It doesn't occur at a specific place or time, and it cannot be turned on or off. Instead, embodiment is a co-constitution, a condition formed at the confluence of mind, body and world. Embodiment is continually transformative, with only certain aspects being consciously apprehended, making it a phenomenon that is difficult to measure or describe. Researchers have approached the subject from differing fields and perspectives, often relying on traditional

methods of inquiry. Investigations of embodiment in the context of computer science and human-computer interaction (HCI) for instance, often approach the subject solely from a so-called third-person perspective. These approaches are limited, however, because they do not take into account qualitative, first-person aspects. Thus, with a few notable exceptions, these approaches result in solely descriptive accounts of various actions, perceptions or specific senses. In contrast, purely first-person accounts are often dismissed in academic realms as anecdotal. If we turn to the existentialist phenomenological tradition, out of which the study of embodiment originated, we find an approach to being and experience that takes the body, subjective points of view and meaning seriously. Because of its multidisciplinary perspective, Existentialist Phenomenology has provided the basis for numerous contemporary approaches to the study of embodiment. These approaches enable inquiry into experience without summarily dismissing what can be known from scientific realms. The Existentialist Phenomenological tradition thus offers a unique and constructive way to approach the study of embodiment, and it is with these methods that embodiment is best understood.

Some interactive artists have been drawn to phenomenology, perhaps because it provides a meaningful approach to examining embodied experience [4,11]. Embodied, interactive art is not about aesthetics understood as beauty or pleasure; instead, embodied art is about experiences of interaction. It is not watching the ballerina soar through the air — it is about *being* the ballerina. Recent research into mirror neurons, for example, suggests that even observation without interaction allows a viewer to experience some degree of movement. While many interactive artists and theorists explore embodiment to some degree [11], most have focused on aspects that are in a sense “visible” to the exteroceptive senses (e.g. touch) [27], or exist adjacent to or outside the body altogether (e.g. space). Few artists and researchers, however, have explored the “invisible” or “inner” aspects of embodiment.

Aaron Levisohn and Diane Gromala designed an interactive artwork titled *Taro(t)ception* to explore embodied interactive art. *Taro(t)ception* focuses on the proprioceptive sense which relays ever-changing information about the position and movement of our body. *Taro(t)ception* uses perceptual illusions to intentionally disrupt our everyday experience of proprioception in order to focus attention on the act of bodily movement and its “bound” relations to vision and tactility, interpretation and meaning-

making. These disruptions produce an embodied effect tied to ancient notions of aesthetics, narrative and interaction. In the context of the artwork these processes are tightly related to specific Tarot Cards and other artifacts reflecting the history of divination. The remainder of the paper describes *Taro(t)ception* in detail and reviews the theories and concepts underlie its functioning.

2. TARO(T)CEPTION AS AN ARTWORK

Gromala and Levisohn developed an interactive artwork titled *Taro(t)ception*, a work-in-progress that has met a proof-of-concept and that is in the stages of full development and testing. *Taro(t)ception* has proven to elicit embodied, subjective experiences that interactors are able to register to varying degrees. One commonly reported experience is an awareness of the dislocation of the interactor's body. Some interactors have remarked that their experiences in *Taro(t)ception* recall their prior experiences with immersive virtual reality (VR) and other artworks that engage with movement or perception, such as David Rokeby's *Very Nervous System* [26]. *Taro(t)ception* employs augmented reality (AR) technology, which incorporates an interactor's physical actions and senses directly in relation to a highly subjective, multiply interpretive, interactive, partially self-constructed narratives. As with many kinds of interactive narrative, a non-stable *frisson* arises between the intention of the authors and the multiple ways interactors co-create a narrative.

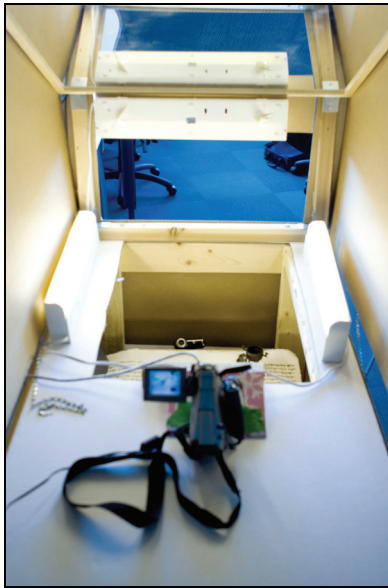


Figure 1. The interior of the box (from behind)

To engage with *Taro(t)ception*, interactors look into a six-foot high box, through what appears to be a transparent window, but is actually an LCD screen, located just above elbow height. Interactors initially see an “objective,” perspective “correct” view of objects that lie under the “window.” Interactors manipulate these objects — fortune-telling artifacts from various world cultures — with one or both hands. What they then see in the “window” are their hands as they manipulate and examine the objects. But the window is not “transparent” per se: it displays what the interactors “should” see, overlaid with translucent images in registration with their hands. Additionally, perceptual distortions are displayed according to the distinctive aspects of

particular objects. Needless to say, our contemporary cultural context changes our relation to and interpretation of these artifacts; however, rather than dismissing them out of hand as remnants of superstitious beliefs, we conceptualize them as “touchstones” — ways to recall systems of belief and divination practices that persist in our own time, perhaps because they speak to on-going human desires to make meaning, and to anticipate the future.



Figure 2. Interacting with *Taro(t)ception*

The artifacts in *Taro(t)ception* recall ancient divination practices that involved a crystal ball, a magnifying glass, as well as body parts of animals, from inscribed shoulder blade bones to various organs and entrails. The Tarot Cards in *Taro(t)ception*, however, are a main focus, as users choose which cards they will place in the box. Here, we re-appropriate the visually rich, symbolic nature of Tarot Cards, and the multiple ways in which interactors interpret them in contemporary contexts. From the realm of Visual Studies, we offer a technologically-mediated, perceptually provocative approach to the multiplicity of ways we ascribe meaning to visual symbols. In this process, the interaction functions to shift attention to a deeper sense of embodied self-awareness. Moreover, since our approach grows out of the notion of embodiment from existentialist phenomenology and consciousness studies, we do not focus on the visual at the exclusion of other senses, but understand interoceptive and exteroceptive senses to work in recombinant syntheses, a process referred to as “binding” in consciousness studies and neuroscience. [5,30]. Referring to specific senses is a contentious issue, in part because neuroscientists and consciousness researchers have identified and demonstrated the issue of “binding” [5,30]. That is, sensations “bind” or work together so that we experience the world holistically. Nevertheless, provisional references to underexplored senses are useful in fleshing out aspects that comprise experiences. Thus the tangible interactions combine with real-time, perceptual illusions to provoke awareness of proprioception in the process of divinatory interpretations of Tarot symbols.

Interactors are able to explore the array of divinatory artifacts in more detail using an antique magnifying glass that can be accessed through the open front of the box. Instead of seeing enlarged views of the objects, however, the glass acts as a green-screen on which culturally relevant and historically poignant video clips are displayed. Each of the major Arcanum Tarot cards thus trigger a *mélange* of images that symbolically relate to radically diverse aspects of the “subject” of each Tarot card. As an example, the Tower card initiates video clips that portray literal images of the Twin Towers in 9/11, Pruitt Iago imploding, the Hindenburg crashing into its landing tower, and the unfinished Tower of Babel. These are interspersed with images that are more symbolic of sudden, disruptive change, such as recent and historical political revolutions, economic depressions, famines, iconic images of scientific paradigm shifts, natural and human-made disasters and plagues, divorces and numerous kinds of dissolutions, death, birth and initiation rites, ideological clashes, and so on.



Figure 3. Exploring with the magnifying glass

The location of the magnifying glass along with the specific tarot cards placed inside the box co-vary the visual rhetoric, or styles, and semantics of the video footage displayed. As the interactor explores the artifacts, visual effects and perceptual illusions are programmed to alter the entire scene – including the interactor’s own hands. The perceptual illusions are achieved by continually time-shifting the video and calling up video effects such as ghosting trails. These create a disjuncture between what the interactors see and what they may emotionally and physically “feel.” These ruptures, we believe, temporarily disturb or shock us out of our habituated primacy of vision and/or the relations among vision, proprioception, tactility, and balance. Additionally, the use of multiple video layers creates an unfamiliar, temporal-spatial world with shifting frames of reference that further destabilize the interactor’s mind-body-world relationships. The result of this often produces a heightened awareness of the mind-body relations of interactive experience, or as some interactors has described it, an “immersive trance.”

3. PROPRIOCEPTION

Common lore perpetuates the notion that there are only five senses. There are, however, a multitude of sensory inputs that function throughout the human organism. When we stop to consider the range of perceptual information of which humans are aware, it becomes difficult to ascribe names to them all. One way

of identifying these senses is to categorize them based on the type of information they provide. One useful categorization involves labeling our senses as either focused on external stimuli (exteroception) or on internal bodily awareness (interoception). This is a provisional distinction, however, because, as we have stated, senses and “senses of” are bound together in complex, holistic ways during experience.

We tend to be more aware of our exteroceptive senses since it is through them that we gather information about our environment, they provide most of the information we know about the world, and because we have been conditioned to be aware of them. These senses are also tied in with our sense of mobility, allowing us to shift our gaze, or adjust our position to focus our attention on a specific sensory capacity. Interoceptive senses, on the other hand, generally remain in the background of awareness, only coming into conscious awareness when something is not working correctly, such as vertigo, or when certain human desires and needs make themselves known in order to propel action, such as hunger or sexual desire [18]. The interoceptive senses provide awareness of our internal organs, alerting us, for example, when we have eaten contaminated or rotten food, or when we are under extreme stress or danger. In addition, the interoceptive senses are what give us the ability to know about our body’s position and location. There are several sensory organs that aid in this, including vestibular awareness, which lets us know which way is up. This sensory apparatus is modulated by a fluid filled organ in the ear, the same organ that causes us to become dizzy when we spin around. Without the vestibular apparatus, we would have no sense of balance, making even the act of walking all but impossible [3]. We have all likely become dizzy or lost our sense of balance at some point during our life, so accepting vestibular awareness as a sense shouldn’t be much of a conceptual leap. There are other senses, however, that are so tied in to our sense of “being” that they disappear into the background of our awareness, making it is difficult to identify them as senses at all. Proprioception can be characterized in this manner.



Figure 4. The Tarot Cards

Proprioception is what makes us aware of our body’s position and motion. This sense is relayed through nerves and other processes in the joints, muscles, tendons and skin which provide postural information including the angles at which our limbs are bent,

where we are in space, and how we feel our bodies' limits and ranges of motion [17]. With this information, we construct a body map that gets continuously updated as we move in the world [10]. This map also provides us with an awareness of our body in relation to objects around it. This sense is so integral to our ability to move, reach, and grasp that it is often taken entirely for granted. Working in tandem with the vestibular apparatus, proprioception is one of the most common senses that are disrupted in VR simulations. When our proprioceptive awareness conflicts with our visual perceptions, a process of adaptation occurs during which we either habituate and reconcile our conflicting sensory input or get *simsick*. This process occurs during VR simulations of flying, for example, during which users continue to register the pull of gravity. Because proprioception is so tied in with our sense of body ownership, it affects our "being" in the world, and thus could be called an *ontological sense*.

The proprioceptive sense has been the subject of scientific research since its classification in the early 20th century by C.S. Sherrington [29]. Much of the research on the subject investigates the nature of proprioception – how our body tracks limb position, and how this information is used in the construction of a body map. James Lackner and Paul DiZio explored the phenomenon of proprioception by identifying methods that disrupt a participant's orientation using vibration [17]. They found that vibration of postural muscles and neck muscles induced an illusion of body motion or displacement. Lackner along with other researchers have also examined the close relationship between the tactile sense and proprioceptive awareness [34]. Interactive artist Catherine Richards also explored this illusion with computer scientist Chris Shaw in a piece makes the interactors feel as though their fingers extend infinitely [24]. Multiple research studies have also explored rubber hand illusions (RHI) as a means of generating proprioceptive illusions [21,32]. RHI studies use prosthetic hands to distort a participant's sense of limb location.

Proprioception has also been explored by artists interested in the aesthetic properties of movement. Gromala and Yacov Sharir explored this in one of the earliest VR artworks [11]. In *Dancing with the Virtual Dervish: Virtual Bodies*, interactors navigate through an immersive VR environment made wholly of organic body parts derived from MRI data. Because the environment was constantly moving, because it had no rectilinear reference points, and because it permitted six degrees of freedom, the vast majority of users stated that they felt a "body warp" — a (usually) pleasurable disturbance of their proprioceptive sense. It is this alteration of proprioceptive awareness that produces the aesthetic experience. Barbara Montero, a dancer and theorist, suggests that proprioception is an aesthetic sense, one that is integral to an audience's experience of a dance performance [23]. She justifies this claim using recent scientific evidence regarding the functioning of Mirror Neurons. Mirror Neurons are a specific type of brain cell that is activated whether an individual is enacting a movement or observing a similar movement [25]. Montero suggests that an audience at a performance is actually having an aesthetic movement-based experience, not solely a visual one [23].

Taro(t)ception, is an interactive artwork that contributes to a line of inquiry regarding embodiment that includes, among the issues outlined above, the aesthetic nature of proprioception. Rather than solely providing somewhat passive experiences that result from watching dancers, it instead enables a direct, interactive

experience. Using time shifting video effects to elicit proprioceptive illusions, interactors' relationships with their own body are transformed, evoking a re-vivified aesthetic experience.

Taro(t)ception also functions as another form of inquiry. Although it is beyond the scope of this paper, the methods used here are also meant to inform related HCI research. The approach here is to examine different kinds of interactions and perceptual illusions that are tied to narrative interpretation and construction. Both third-person accounts and first-person accounts are integrated in this approach.

4. EMBODIMENT

Taro(t)ception is not meant to appeal to the lay notion of aesthetics based on ideals of beauty or a Kantian sublime [16]. Rather, the aesthetic experience of interaction with *Taro(t)ception* is intended to evoke an awareness of embodiment. Embodiment is a concept that developed in direct opposition to the Cartesian separation of mind and body. The theme of embodiment posits that the body is the very basis of the construction of conscious experience. It does not dismiss the role of the brain in cognition, but rather views it as an organ within the body. The term embodiment is often misused to describe the body's role in the cognition while maintaining the Cartesian mind/body split. Thus, this can be understood to be an incorrect usage of the term.

Embodiment is not just a mental concept about which philosophers, psychologists, and scientists muse; rather, embodiment concerns the very nature of being. Embodiment emphasizes the processual nature of existence and the primacy of perceptual and sensory qualia in constructing experience. It must also contend with millennia-long historical traditions that view mind and body as separate, and of bodily subservience to the "rational" mind.

4.1 Edmund Husserl

The theory of embodiment originates, for the most part, in the phenomenological tradition first espoused by Edmond Husserl [1]. Husserl developed phenomenology as an alternative to the scientific method in order to explore the structure of consciousness in an objective manner. Phenomenology emphasizes first-person, subjective methods, through which Husserl studied pre-conscious experience, the structure of which he believed was common to all people [13]. His philosophy focused on experiencing the world as it is, without speculation or judgment. Husserl's approach garnered much criticism from his contemporaries, including his student Martin Heidegger, who disagreed with the notion that consciousness was equivalent to existence. Heidegger went on to develop an alternate branch of phenomenology focused on the concept of *Being* [12]. Other philosophers also split with Husserl and went on to develop alternate theories of phenomenology, which continue to evolve to this day. Husserl's branch of phenomenology became known as Transcendental Phenomenology. Existential Phenomenology refers to the form of phenomenology elaborated by Heidegger and Maurice Merleau-Ponty [1]. Together with its contemporary manifestations, this is the form we draw upon.

4.2 Martin Heidegger

We can trace the roots of the philosophy of embodiment in Heidegger's work. He focused on the concept of *Being*, and

rejected the transcendental *bracketing* of experience that Husserl endorsed [12]. Heidegger understood all human activity to occur in a world and a context that are central to experience, not to be “bracketed” out of consideration. Heidegger also rejected the notion of phenomena existing separately from activity, arguing for a non-Cartesian approach to experience. Although he did not introduce the term embodiment, Heidegger introduced philosophical concepts and an orientation that were instrumental in its conception. For example, one of Heidegger’s most important contributions was the introduction of the terms ready-to-hand (*zuhanden*) and present-at-hand (*vorhanden*) [12]. He used these terms to describe different manners of awareness, and of being in the world. *Ready-to-hand* denotes a relation with the world in which objects have usefulness. It is contrasted with *present-at-hand* which denotes an attitude of detachment, that is, one in which the world is observed rather than acted in. For example, someone actively using a hammer would experience the hammer as *present-at-hand*, as if the hammer was an extension of one’s arm and hand. However, if while hammering, the hammer broke, the activity would be interrupted. No longer a “transparent” technological extension of arm and hand, the hammer becomes *present-at-hand*, an object disconnected from one’s body and actions. Heidegger claimed that it is most “natural” for us to experience objects in the world as *ready-to-hand*.

4.3 Maurice Merleau-Ponty

It is in the philosophy of Maurice Merleau-Ponty that phenomenology fully recognizes the primacy of the body in the construction of experience [22]. Merleau-Ponty took the body seriously, not as a linguistic metaphor, but as the very basis of meaning and being. For Merleau-Ponty, the mind, body and world co-constitute experience in differing, always changing ways. Further, Merleau-Ponty did not limit bodily experience to those aspects of which we are conscious, but also included those of which we are not aware, including motor intentionality and so-called inner processes.

The use of the term embodiment has come to have a variety of subtle differentiations depending on one’s discipline and outlook. Often it is used to refer to the concept of embodied cognition, which explores the role of the body in the development and expansion of human cognitive abilities. Other theories of embodiment have grown out of Merleau-Ponty’s, such as those espoused by Francesco Varela [6,33], Hubert Dreyfus [8], Paul Dourish[7], Don Ihde [14], Drew Leder [18], Samuel Todes [31], Iris Young [35], and Antonio Damasio [2], among others.

4.4 Cognitive Science

Despite the long history of embodiment in philosophical and eastern spiritual traditions, acceptance of theories of embodiment by scientific communities did not take root until the 1950s in the works of psychologists such as Jean Piaget and the biologist Jakob von Uexküll [20]. Interestingly, hints of an early theory of embodied cognition can be found in the works of William James, whose descriptions of psychological processes allude to the body’s central role in the production of consciousness [15]. Embodiment in cognitive science and psychology arose as an alternative to earlier models of cognition from both behaviorist and computationalist perspectives. Behaviorism holds that all organic processes and actions, including thinking, can be described as observable behaviors. It developed during the late 1800 in the work of theorists such as Ivan Pavlov, Edward

Thorndike, and B.F. Skinner and continues to be practiced today [20]. The theory of Computationalism was articulated as a theory of mind in the 1960s through the writings of Hilary Putnam and Jerry Fodor. Computationalism views the human mind as an information processing machine that goes through algorithmic sequences in order to evaluate symbols. One of the primary ways that computationalism and most prior forms of western philosophy differ from embodiment is its reliance on internal representations as mental states. Theories of embodied cognition dismiss the notion of representation as a necessary or even viable as a means of generating mental states. Various alternative processes have been hypothesized as a means of producing embodied states, one of the more prevalent of which is Antonio Damasio’s Somatic Marker Hypothesis.

5. SOMATIC STATES

5.1 Antonio Damasio

In his book *Descartes’ Error*, Antonio Damasio researches one of the more unusual aspects of embodiment. In what begins as a series of case studies of brain injuries that resulted in cognitive impairment, Damasio traces the connection between emotion and decision making [2]. In doing so he traces the physiological origin of feelings, inverting the commonly held belief that emotions precede and induce physical symptoms. In his *Somatic Marker Hypothesis*, Damasio posits that body states are induced by affective stimuli in the environment. The associations between stimuli and physiological response are stored as markers in the Ventromedial Prefrontal Cortex. In the future, when stimuli are encountered, all the markers associated with similar experiences are summed to generate a somatic state that manifests as a *feeling*. Damasio’s findings suggest that these somatic states are necessary for ordinary decision making to occur, as exemplified in brain injury cases that resulted in a reduction of emotional affect.

Shaun Gallagher suggests that Damasio’s position in *Descartes’ Error* is, “quite consistent with the existential-phenomenological emphasis on the body proper (e.g. Merleau-Ponty) and the importance of the interaction with the world or environment (e.g. Heidegger) [9].” He does note, however, Damasio’s lack of any philosophical background. Viewing Damasio’s Somatic Marker Hypothesis from a phenomenological perspective is useful for several reasons. First, the proposal that physiological states precede cognitive awareness parallels and provides evidence for the phenomenological concept of pre-reflective experience. Additionally, by reclaiming the body as the focal point of experience, Damasio corroborates the notion put forth by *Enactivists* such as Varela, that one of the most productive ways to study conscious experience is through the cultivation of mindfulness using meditative practice [33].

5.2 Maxine Sheets-Johnstone

Maxine Sheets-Johnstone takes a more movement-centered approach to emotions. In fact, she criticizes Damasio for his focus solely on the physiological state of the body as the constituent of emotion [28]. Sheets-Johnstone argues that movement and emotion are inseparable, noting that “a particular kinetic form of an emotion is not identical with the emotion but is dynamically congruent with it [28].” Sheets-Johnstone cites the work of Edmund Jacobson as evidence of the connection between emotions and neuro-muscular tension. She also argues that from

an evolutionary perspective, emotion is not intended as an aid to communication; rather, it acts as a motivation for action.

While Damasio and Sheets-Johnstone disagree on numerous points, taken together, these two theorists provide theoretical foundations for an exploration of the role of somatic states (e.g. emotions) on the experience of interaction. Damasio's work offers a practical definition of somatic states that includes, but extends beyond, the purely emotional. Sheet-Johnstone articulates a theoretical perspective that enforces embodiment (a term that she disapproves of) by refusing to separate the cognitive from the bodily at any level.

Taro(ct)ception is the direct application of Damasio and Sheets-Johnstone's theories in the construction of an interactive artwork capable of transforming an interactor's felt-experience of movement. Through the use of culturally evocative visual stimuli, *Taro(t)ception* elicits subtle shifts in awareness, inducing an affective response in the interactor. Visual-temporal effects displayed directly onto the interactor's own mirrored image destabilizes the body schema and focuses perceptual awareness towards the experience of one's own body. (For a full description of these methods and their effects see [19]). Interactors have described their experience with *Taro(t)ception*, using terms such as "bodily dislocated" and "out-of-body," emphasizing the embodied nature of the experience, and the role of proprioception.

6. FUTURE WORK

Taro(t)ception is an ongoing project that will necessarily evolve as we explore the nature of embodied aesthetics and ontological interactions. *Taro(t)ception* has many limitations, including the constraints on movement due to the nature of the interface. In order to better explore the nature of these phenomena, we plan to design larger works that allow for full-body engagement.

7. CONCLUSION

While the full range of the human sensorium play a role in the nature of aesthetic experience, isolating any of the five "primary" senses is conceptually problematic because the senses "bind" together to create an integrated, embodied experience. In addition, the role of inner sensations often remain under-examined. Nevertheless, provisional distinctions between exteroceptive and interoceptive processes are useful in accounting for some aspects of embodied experience that usually remain below normative awareness. Contextualized in an existentialist phenomenological perspective, the senses work together to elicit ontological aesthetic experiences that are embodied, felt, and lived by interactor of interactive art.

We approached the design of *Taro(t)ception* using theories from a wide range of disciplines, primarily drawing from existentialist phenomenology and secondarily from those areas of cognitive science that are concerned with embodiment. The phenomenological tradition provides an orientation, concepts and tools with which to explore and discuss conscious experience. Theories of embodiment ground our phenomenological inquiry by insisting on the primacy of the body in experience, from Merleau-Ponty's earlier work to Drew Leder's examinations of interoception. Cognitive science, with its unique approach to embodied cognition, provides empirical evidence of the relationship between mental, or somatic, states, and our bodily experiences. Damasio's *Somatic Marker Hypothesis* in particular

addresses this phenomenon [2]. Because embodiment is about being and experience, it seems necessary for our efforts to go beyond strictly linguistic discourse; thus, we view the creation of artwork as an important part of our examination of embodiment, since it enables or provokes felt experience in a very different way than textual forms do.

Taro(t)ception combines sensorially rich content with historically and culturally evocative artifacts to create an embodied, interactive aesthetic experience. The project takes advantage of Augmented Reality (AR) technology to incorporate the interactor's actions in a highly subjective and embodied narrative. Utilizing perceptual illusions to disrupt experiences of action and movement, *Taro(t)ception* appears to elicit a greater awareness of interoceptive processes, particularly that of proprioception. Through the thoughtful combination of elements, *Taro(t)ception* is able to generate a unique experience that exemplifies an aesthetics of movement and enhances an awareness of interoceptive processes, such as proprioception.

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9. REFERENCES

- [1] Audi, R. *The Cambridge Dictionary of Philosophy*. Cambridge University Press, 1999.
- [2] Damasio, A.R. *Descartes' Error: Emotion, Reason, and the Human Brain*. Avon Books, New York, 1995.
- [3] Danilov, Y.P., Tyler, M.E., Skinner, K.L., and Bach-y-Rita, P. Efficacy of Electrotactile Vestibular Substitution in Patients with Bilateral Vestibular and Central Balance Loss. *Conf. Proc. Annual International Conference of the IEEE Engineering in Medicine and Biology Society. Suppl.*, (2006), 6605-6609.
- [4] Davies, C. and Harrison, J. Osmose: towards broadening the aesthetics of virtual reality. *ACM SIGGRAPH Computer Graphics* 30, 4 (1996), 25-28.
- [5] De Gelder, B. and Bertelson, P. Multisensory Integration, Perception and Ecological Validity. *Trends in Cognitive Sciences* 7, 10 (2003), 460-467.
- [6] Depraz, N., Varela, F.J., and Vermersch, P., eds. *On Becoming Aware: A Pragmatics of Experiencing*. J. Benjamins, Amsterdam, 2003.
- [7] Dourish, P. *Where the Action Is: The Foundations of Embodied Interaction*. The MIT Press, 2004.
- [8] Dreyfus, H.L. *Being-in-the-World: A Commentary on Heidegger's Being and Time, Division I*. The MIT Press, 1990.
- [9] Gallagher, S. Mutual Enlightenment: Recent Phenomenology in Cognitive Science. *Journal of Consciousness Studies* 4, 3 (1997).

- [10] Gallagher, S. *How the Body Shapes the Mind*. Clarendon, Oxford, 2005.
- [11] Gromala, D., Novak, M., and Sharir, Y. Dancing with the Virtual Dervish. *Fourth Biennial Arts and Technology Symposium. New London, Connecticut: Connecticut College*, (1993).
- [12] Heidegger, M. *Being and time*. Trans. John Macquarrie and Edward Robinson. Wiley-Blackwell, 2000. Trans. of *Sein und Zeit*, 1927.
- [13] Husserl, E. *Ideas: General Introduction to Pure Phenomenology*. Trans. Kersten, F., The Hague: Nijhoff., 1982. Trans. of *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie., 1913*.
- [14] Ihde, D. *Technics and Praxis: A Philosophy of Technology*. Springer, 1978.
- [15] James, W. *Psychology: The Briefer Course (1892)*. University of Notre Dame Press, 1985.
- [16] Kant, I. *Critique of Judgment*. Trans. Werner S. Pluhar., Hackett Publishing Co., 1987. Trans. of *Kritik der Urteilskraft*, 1790.
- [17] Lackner, J.R. and DiZio, P. Vestibular, proprioceptive, and haptic contributions to spatial orientation. *Annual Review of Psychology* 56, (2005), 115-147.
- [18] Leder, D. *The Absent Body*. University Of Chicago Press, 1990.
- [19] Levisohn, A.M. The Body as a Medium: Reassessing the Role of Kinesthetic Awareness In Interactive Applications. *Proceedings of the 15th international conference on Multimedia*, ACM (2007), 485-488.
- [20] Lindblom, J. Minding The Body : Interacting Socially Through Embodied Action. 2007, 308.
- [21] Longo, M.R., Schüür, F., Kammers, M.P., Tsakiris, M., and Haggard, P. What is Embodiment? A Psychometric Approach. *Cognition* 107, 3 (2008), 978-998.
- [22] Merleau-Ponty, M. *Phenomenology of Perception: An Introduction*. Trans. Colin Smith. Routledge, London 1981. Trans. of *Phénoménologie de la perception, 1962*.
- [23] Montero, B. Proprioception as an Aesthetic Sense. *Journal of Aesthetics & Art Criticism* 64, (2006), 231.
- [24] Richards, C., Korba, L.W., Shaw, C., and Green, M. Virtual Reality and Virtual Bodies. *Proceedings of SPIE*, (1994), 386-396.
- [25] Rizzolatti, G. and Craighero, L. The Mirror-Neuron System. *Annual Review of Neuroscience* 27, 1 (2004), 169-192.
- [26] Rokeby, D. *Very Nervous System*. 1986.
- [27] Schiphorst, T. and Nack, F. Affectionate Computing: Can We Fall In Love with a Machine? *Multimedia, IEEE* 13, 1 (2006), 20-23.
- [28] Sheets-Johnstone M. Emotion and Movement. A Beginning Empirical-Phenomenological Analysis of their Relationship. *Journal of Consciousness Studies* 6, 11-12 (1999), 259-277(19).
- [29] Sherrington, C.S. On The Proprio-Ceptive System, Especially in its Reflex Aspect. *Brain* 29, 4 (1907), 467-482.
- [30] Stein, B.E. and Meredith, M.A. *The Merging of the Senses*. The MIT Press, 1993.
- [31] Todes, S. *Body and World*. MIT Press, Cambridge, Mass, 2001.
- [32] Tsakiris, M., Prabhu, G., and Haggard, P. Having a Body Versus Moving Your Body: How Agency Structures Body-Ownership. *Consciousness and Cognition* 15, 2 (2006), 423-432.
- [33] Varela, F.J., Thompson, E., and Rosch, E. *The Embodied Mind: Cognitive Science and Human Experience*. MIT Press, 1991.
- [34] de Vignemont, F., Ehrsson, H.H., and Haggard, P. Bodily Illusions Modulate Tactile Perception. *Current Biology* 15, 14 (2005), 1286-1290.
- [35] Young, I.M. *On Female Body Experience*. Oxford University Press US, 2005.